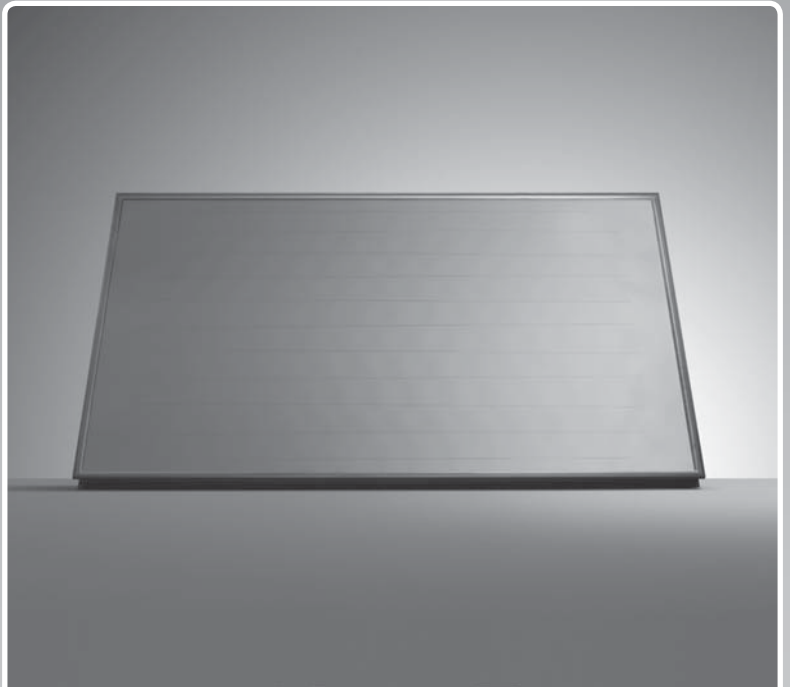


For the competent person

## Installation manual



### auroTHERM, auroTHERM plus

VFK 145 H/V, VFK 150 H/V, 155 H/V

**GB, IE**

**Legal information**

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## Contents

<b>1</b>	<b>Notes on the documentation .....</b>	<b>5</b>	2.5	Regulations (directives, laws, standards) .....	8
1.1	Symbols used .....	5	2.5.1	Installation regulations.....	8
1.2	Observing other applicable documents .....	5	2.5.2	Regulations for the prevention of accidents .....	8
1.3	Document storage .....	5	2.6	CE label.....	9
1.4	Applicability of the instructions .....	5	<b>3</b>	<b>Description of the unit .....</b>	<b>10</b>
1.5	Name.....	5	3.1	Type overview .....	10
<b>2</b>	<b>Safety.....</b>	<b>6</b>	3.2	Information on the identification plate .....	10
2.1	Action-related warnings.....	6	3.3	Purpose of the unit.....	10
2.2	Required personnel qualifications.....	6	<b>4</b>	<b>On-roof fitting and installation .....</b>	<b>11</b>
2.2.1	Authorised competent person.....	6	4.1	Preparing for fitting and installation .....	11
2.3	General safety information .....	6	4.1.1	Delivery, transport and positioning.....	11
2.3.1	Danger due to improper use .....	6	4.1.2	Complying with clearances and installation clearances.....	14
2.3.2	Risk of death due to improper fastening systems .....	6	4.1.3	Selecting suitable connection.....	14
2.3.3	Risk of death due to inadequate load-bearing capacity of the roof .....	6	4.1.4	Preparing the roof duct.....	14
2.3.4	Risk of death due to falling parts.....	6	4.1.5	Putting together components .....	16
2.3.5	Risk of injury and material damage due to incorrect maintenance and repairs .....	6	4.1.6	Determining the number of required roof brackets.....	18
2.3.6	Risk of death due to inadequate fastening of the collectors .....	7	4.1.7	Defining the edge clearances of the roof brackets.....	18
2.3.7	Risk of burns due to hot collector surfaces .....	7	4.1.8	Defining the roof bracket clearances .....	18
2.3.8	Risk of injury due to breaking glass .....	7	4.2	Carrying out the installation.....	20
2.3.9	Material damage caused by a high-pressure cleaner .....	7	4.2.1	Installing roof brackets .....	20
2.3.10	Material damage due to lightning.....	7	4.2.2	Installing collectors .....	24
2.3.11	Frost damage due to water in the solar circuit.....	7	4.2.3	Installing hydraulic connections .....	29
2.3.12	Material damage due to an unsuitable tool.....	7	4.3	Completing and checking the installation .....	31
2.3.13	Risk of death from electric shock .....	7	4.3.1	Using the customer service card .....	31
2.3.14	Material damage due to overvoltage.....	7	4.3.2	Checking the installation .....	32
2.3.15	Risk of death and material damage due to contact corrosion.....	7	4.3.3	Disposing of the packaging .....	33
2.3.16	Material damage due to snow falling from roofs.....	7	<b>5</b>	<b>Flat roof fitting and installation .....</b>	<b>34</b>
2.4	Intended use .....	8	5.1	Preparing for fitting and installation .....	34
2.4.1	Intended use .....	8	5.1.1	Delivery, transport and positioning.....	34
2.4.2	Suitability of the equipment.....	8	5.1.2	Complying with clearances and installation clearances.....	36
2.4.3	Improper use.....	8	5.1.3	Selecting suitable connection.....	36
2.4.4	Other applicable documents .....	8	5.1.4	Preparing the roof duct.....	37
			5.1.5	Selecting the installation variant.....	37
			5.1.6	Putting together components .....	38
			5.1.7	Determining the ballast load (floating installation) .....	38
			5.1.8	Defining the rack clearances .....	46

# Contents

5.2	Carrying out the installation .....	47	<b>8</b>	<b>Decommissioning .....</b>	<b>61</b>
5.2.1	Installing racks .....	47	8.1	Temporary decommissioning .....	61
5.2.2	Installing collectors .....	51	8.2	Permanently decommissioning .....	61
5.2.3	Installing hydraulic connections .....	54	8.2.1	Removing collectors .....	61
5.3	Completing and checking the installation .....	55	8.2.2	Recycling and disposal .....	61
5.3.1	Using the customer service card .....	55	<b>9</b>	<b>Customer service .....</b>	<b>63</b>
5.3.2	Checking installation .....	56	<b>10</b>	<b>Technical data .....</b>	<b>64</b>
5.3.3	Disposing of the packaging .....	57	10.1	Technical data table .....	64
<b>6</b>	<b>Inspection and maintenance .....</b>	<b>58</b>	10.2	Dimensions .....	65
6.1	Maintenance plan .....	58	<b>Index .....</b>	<b>67</b>	
6.1.1	Calendar-based maintenance intervals .....	58			
6.2	Observing inspection and maintenance intervals .....	58			
6.3	General inspection and maintenance instructions .....	58			
6.4	Preparing for inspection and maintenance .....	58			
6.4.1	Spare parts for maintenance .....	58			
6.4.2	Preparing for maintenance .....	58			
6.5	Checking collectors and connections for damage, dirt and lack of tightness .....	59			
6.6	Cleaning collectors .....	59			
6.7	Checking brackets and collector components for firm seating .....	59			
6.8	Check the pipe insulations for damage .....	59			
6.9	Replacing damaged pipe insulations .....	59			
6.10	Disposing of damaged pipe insulations .....	59			
<b>7</b>	<b>Troubleshooting .....</b>	<b>60</b>			
7.1	Spare parts for repair .....	60			
7.2	Carrying out repairs .....	60			
7.2.1	Replace leaking collectors .....	60			
7.2.2	Disposing of defective collectors .....	60			
7.2.3	Sealing leaking connections .....	60			
7.2.4	Replacing defective pipe insulations .....	60			
7.2.5	Disposing of defective pipe insulations .....	60			













## 1 Notes on the documentation

### 1.1 Symbols used

#### Symbols

The following symbols may appear:

	Warning symbol (→ Page 6)
	Information symbol
	Symbol for a required action
	Symbol for the result of an action
	Symbol for the completion of records and check-lists
	Symbol for a required qualification
	Symbol for a required tool
	Symbol for the specification of a technical value
	Symbol for adjacent array configuration
	Symbol for array configuration on top of each other

### 1.2 Observing other applicable documents

- All installation instructions for the component parts and components of the solar plant must be observed when installing the collectors.

These installation instructions are enclosed with the various system parts and supplementary components.

### 1.3 Document storage

#### Document handover

- Pass this installation manual and all other applicable documents and, if necessary, any required tools to the system operator.

#### Availability of documents

The system operator is responsible for storing the documents so that they are available whenever required.

### 1.4 Applicability of the instructions

These instructions apply for the following only:

#### Collector types and article numbers

<b>VFK 145 H</b>	0010004457, 0010008899
<b>VFK 145 V</b>	0010004455, 0010008898
<b>VFK 150 H</b>	0010006285, 0010008902
<b>VFK 150 V</b>	0010006283, 0010008901
<b>VFK 155 H</b>	0010013174
<b>VFK 155 V</b>	0010013173

Table 1.1: Collector types and article numbers

### 1.5 Name

In this manual, flat collectors are referred to as collectors.



## 2 Safety



## 2 Safety

### 2.1 Action-related warnings

#### Classification of action-related warnings

The action-related warnings are classified in accordance with the severity of the possible danger using the following warning signs and signal words:

#### Warning symbols and signal words



**Danger!**

Imminent danger to life or risk of severe personal injury



**Danger!**

Risk of death from electric shock



**Warning.**

Risk of minor personal injury



**Caution.**

Risk of material or environmental damage

### 2.2 Required personnel qualifications

This manual is intended for persons with the following qualifications

#### 2.2.1 Authorised competent person

The installation, assembly and removal, start-up, maintenance, repair and decommissioning of Vaillant products and accessories must only be carried out by authorised competent persons.



**Note**

Each competent person is qualified for specific activities on the basis of their training. They must only work on units if they have the required qualification.

When working on the units, the competent persons must observe all applicable directives, standards, laws and other regulations.

### 2.3 General safety information

#### 2.3.1 Danger due to improper use

Vaillant **auroTHERM VFK** flat collectors are constructed using state-of-the-art technology in accordance with the recognised safety rules and regulations. Nevertheless, there is still a risk of injury or death to the user or others or of damage to the unit and other property in the event of improper use or use for which it is not intended.

#### 2.3.2 Risk of death due to improper fastening systems

The collectors may fall due to improper fastening systems. Only the combination of Vaillant collectors and Vaillant fastening systems has been tested. This combination can withstand the forces caused by additional wind and snow loads.

- Only use the collector fastening systems that are approved by Vaillant.

#### 2.3.3 Risk of death due to inadequate load-bearing capacity of the roof

A roof with an insufficient load-bearing capacity may collapse due to the additional load of the collectors.

Above all, additional wind and snow loads may result in higher forces which could cause the roof to collapse.

- Ensure that a structural engineer has confirmed the roof as suitable for collector installation.
- Only install the collectors on a roof that has adequate load-bearing capacity.

#### 2.3.4 Risk of death due to falling parts

Unsecured collectors can fall from the roof and present a danger to persons.

- Block off the areas in the fall area below the place of work to a sufficient extent so that persons cannot be injured by falling objects.
- Indicate the working area, e.g. with information signs, in accordance with the applicable regulations.

#### 2.3.5 Risk of injury and material damage due to incorrect maintenance and repairs

If maintenance or repair work is not carried out, or is carried out incorrectly, this may result in injuries or in damage to the solar plant.

- Ensure that only an approved competent person carries out maintenance and repair work.



### 2.3.6 Risk of death due to inadequate fastening of the collectors

Collectors can fall from their anchors if they are not properly fastened on the roof. Collectors falling from the roof could cause life-threatening accidents.

- ▶ Perform all work steps as described in this manual.
- ▶ Observe all safety precautions described in this manual.
- ▶ In addition, comply with all safety regulations that specifically apply in your region.

### 2.3.7 Risk of burns due to hot collector surfaces

In the event of solar radiation inside the units, collectors can reach 200 °C. If you touch the collectors without protection, you could burn yourself.

- ▶ If a sun protection film has been attached to the collectors in the factory, remove it only after the solar plant has been started up.
- ▶ Avoid performing installation and maintenance work under direct sunlight.
- ▶ Cover the collectors before starting work.
- ▶ You should preferably perform the work in the morning.
- ▶ Wear suitable safety gloves.

### 2.3.8 Risk of injury due to breaking glass

The glass of the collectors may break due to mechanical destruction or torsion.

- ▶ Wear suitable safety gloves.
- ▶ Wear suitable protective goggles.

### 2.3.9 Material damage caused by a high-pressure cleaner

High-pressure cleaners may damage the collectors due to the extremely high pressure.

- ▶ Never clean the collectors with a high-pressure cleaner.

### 2.3.10 Material damage due to lightning

Lightning can damage the collector system.

- ▶ Connect the collector system to a lightning protection device in accordance with applicable regulations.

### 2.3.11 Frost damage due to water in the solar circuit

Water residue in the collector may freeze in frosty conditions and damage the collector.

- ▶ Never fill or flush the collector with water.

- ▶ Only fill and flush the collector with Vaillant ready-mixed solar fluid.
- ▶ Check the solar fluid regularly with an antifreeze tester.

### 2.3.12 Material damage due to an unsuitable tool

An unsuitable tool may damage the solar plant.

- ▶ Only use a suitable tool.
- ▶ In particular, only use the tool specified in the work steps of this manual.

### 2.3.13 Risk of death from electric shock

Incorrect installation or a faulty power cable can result in a supply voltage on the pipes, which can cause life-threatening injuries.

- ▶ Secure earthing pipe clamps to the pipes.
- ▶ Connect the earthing pipe clamps to a busbar using 16 mm<sup>2</sup> copper cable.

### 2.3.14 Material damage due to overvoltage

Overvoltage may damage the solar plant.

- ▶ Earth the solar circuit to provide equipotential bonding and overvoltage protection.
- ▶ Secure earthing pipe clamps to the pipes.
- ▶ Bond the earthing pipe clamps to a busbar using 16 mm<sup>2</sup> copper cable.

### 2.3.15 Risk of death and material damage due to contact corrosion

For roofs or façade sections made of metals more precious than aluminium (e.g. copper roof), contact corrosion may occur on the brackets. Collectors could fall and put persons at risk.

- ▶ Use suitable underlays to separate the metals.

### 2.3.16 Material damage due to snow falling from roofs

If the collector field is installed below a sloping roof, then snow falling from the roof may damage the collectors.

- ▶ Install snow fences above the collectors as protection against falling snow.



## 2 Safety



### 2.4 Intended use

#### 2.4.1 Intended use

Vaillant **auroTHERM VFK** flat collectors are used for solar heating support and for solar-supported hot water generation.

#### 2.4.2 Suitability of the equipment

The collectors must only be operated with Vaillant ready-mixed solar fluid. Passing heating water or hot water directly through the collectors constitutes improper use.

#### 2.4.3 Improper use

Any use which is not explicitly mentioned in the chapter "Intended use" (→ Page 8) is deemed improper.

Any other or additional use does not comply with the intended use. Any direct commercial or industrial use is also deemed to be improper. The manufacturer/supplier is not liable for any damage resulting from such use. The user alone bears the risk.

##### 2.4.3.1 Combination with other components

Vaillant **auroTHERM VFK** flat collectors must only be combined with components (fastenings, connections, etc.) and system parts that are supplied by Vaillant. The use of other components or system parts shall be considered as improper use.

##### 2.4.3.2 Installation in or on vehicles

Installation of the Vaillant **auroTHERM VFK** flat collector in or on a vehicle is not permissible and is considered improper use. Units that are not classed as vehicles are those that are installed in a fixed and permanent location (known as "fixed installation").

#### 2.4.4 Other applicable documents

Intended use includes the following:

- observance of accompanying operating, installation and servicing instructions for Vaillant products as well as for other parts and components of the system,
- installing and fitting the unit in accordance with the boiler and system approval,
- compliance with all inspection and maintenance conditions listed in the instructions.

### 2.5 Regulations (directives, laws, standards)

#### 2.5.1 Installation regulations

##### Regulations

**Applies to:** Great Britain

##### Technical Guidance

The system must be installed in accordance with all relevant and applicable national regulations, and must be installed to suit site conditions. Observe all national regulations, including:

- Working at Heights Regulations 2005
- Health and Safety at Work Act 1974
- Electricity at Work Regulations 1989
- IEE Wiring Regulations BS 7671
- Lightning protection requirements
- Equipotential bonding of electrical installations.

##### Related documents

The installation of the solar system must be in accordance with the relevant requirements of Health and Safety Document No. 635 (The Electricity at Work Regulations 1989), BS7671 (IEE Wiring Regulations) and the Water Supply (Water Fitting) Regulations 1999, or The Water Bylaws 2000 (Scotland). It should also be in accordance with the relevant requirements of the Local Authority, Building Regulations, The Building Regulations (Scotland), The Building Regulations (Northern Ireland) and the relevant recommendations of the following British Standards:

- BS EN 806: Specification for installations inside buildings conveying water for human consumption
- BS 6700: Services supplying water for domestic use within buildings and their curtilages
- BS 5449 Forced circulation hot water central heating systems for domestic premises. Note: only up to 45 kW
- BS. 6880 Low temperature hot water heating systems of output greater than 45 kW
- Part 1 Fundamental and design considerations.
- Part 2 Selection of equipment
- Part 3 Installation, commissioning and maintenance
- BS 6114: Expansion vessels using an internal diaphragm for unvented hot water supply systems
- BS. 4814 Specification for: Expansion vessels using an internal diaphragm, for sealed hot water heating systems
- Unvented hot water systems must comply with building regulation G section 3

#### 2.5.2 Regulations for the prevention of accidents

**Applies to:** Great Britain

When carrying out works such as solar installation work it is necessary to do so in a safe and workman like manner, taking due care of any aspects of the works that could result in



injuries to person in or about the building as well as workers, passers by and the general public at large. To that end these works must conform, but not be limited to, the current regulations in force such as the following:

- Health and Safety at Work act 1974
- Work at Height Regulations 2005
- Electricity at Work Regulations 1989
- All necessary Building Regulations

Work should be preceded by a risk assessment covering all aspects of health and safety risks, or training requirements that can reasonably be foreseen to be associated with the work. All scaffolding in the UK, other than prefabricated (zip-up) scaffold towers, must be designed and constructed by a vetted contractor, and have suitable kick boards, hand rails and where appropriate netting. Areas around the scaffolding should be zoned off and marked with suitable warning signs to a suitable distance to protect persons from falling objects. Workers should have available and use personal protective equipment as necessary. This would include equipment such as fall protection systems, safety gloves, goggles, dust masks as well as any specialised equipment that may be in use such as lifting and handling equipment.

The completed works shall comply with all necessary BS EN Standards and Codes of practice as well as Building control or planning requirements and be confirmed where necessary by notification to building control or the appropriate competence based notification body.

## 2.6 CE label



The CE label documents that the appliances as described in the type overview satisfy the basic requirements of the following directives:

- Directive 97/23/EC of the European Parliament and Council on the approximation of the laws of the member states regarding pressure equipment

## 3 Description of the unit

### 3 Description of the unit

#### 3.1 Type overview





##### Horizontal collector position

- VFK 145 H
- VFK 150 H
- VFK 155 H

##### Vertical collector position

- VFK 145 V
- VFK 150 V
- VFK 155 V

#### 3.2 Information on the identification plate

Information on the identification plate	Meaning
	CE label: The collectors comply with the relevant product-specific European guidelines.
	Solar Keymark: The collectors have been successfully tested according to the rules and requirements for the Solar Keymark.
	Only VFK 150 H, VFK 150 V, VFK 155 H and VFK 155 V: CSTBat: The collectors have been successfully tested according to the rules and requirements for the CSTBat.
	Read the installation manual.
VFK 145 H VFK 145 V VFK 150 H VFK 150 V VFK 155 H VFK 155 V	Type designation
VFK	Vaillant flat collector
145, (150, 155)	Collector output
/2	Unit generation
H	Horizontal design
V	Vertical design
Flat plate collector	Flat collector
A <sub>G</sub>	Gross area
V <sub>F</sub>	Liquid volume
m	Weight
A	Dimensions
Q <sub>max</sub>	Max. output


Information on the identification plate	Meaning
tstg <sub>f</sub>	Stagnation temperature
P <sub>max</sub>	Max. permissible operating pressure
Serial-No. 21054500100028300006000001N4  21054500100028300006000001N4	Bar code with serial number, The 7th to 16th digits of the serial number form the article number

Table 3.1: Information on the identification plate

#### 3.3 Purpose of the unit

The collectors are used for solar heating support as well as for solar-supported hot water generation.

### **4 On-roof fitting and installation**

- ▶ When fitting and installing the collectors, you must observe the chapter "Safety".

#### **4.1 Preparing for fitting and installation**

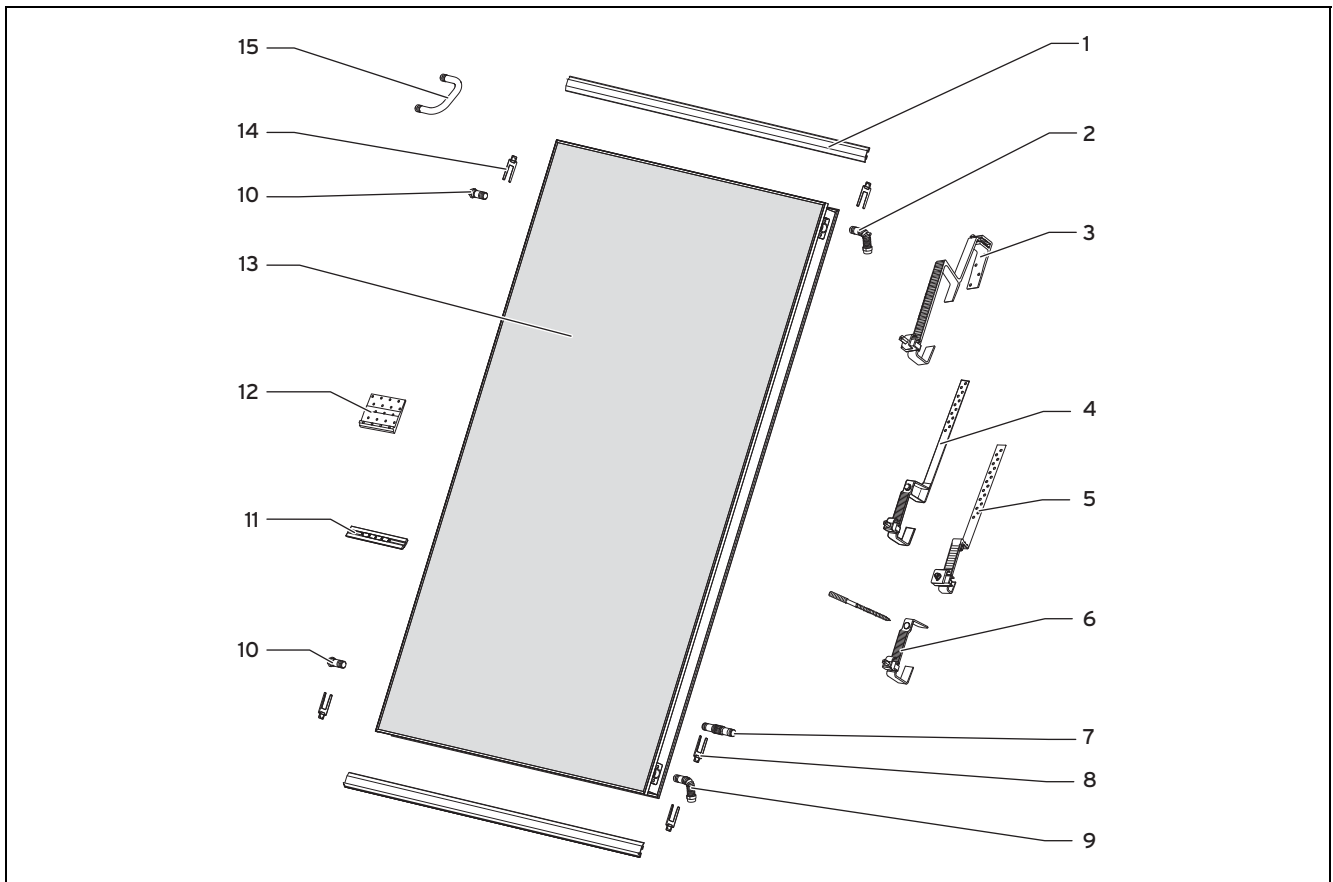
##### **4.1.1 Delivery, transport and positioning**

###### **4.1.1.1 Storing collectors**

- ▶ To prevent moisture from penetrating into the collector, always store the collectors dry and in a weatherproof area.

## 4 On-roof fitting and installation

### 4.1.1.2 Checking the scope of delivery



**Fig. 4.1: Installation set for vertical and horizontal on-roof installation (here: vertical collector)**

#### List of materials for on-roof installation

1	Rail mounting set, vertical 2 pc.	6	Hanger bolt fastening set (basic set) 4 pc.
2	Rail mounting set, horizontal 2 pc.		Hanger bolt fastening set (extension set, on top of each other) 2 pc.
3	Flow (outlet with opening for collector sensor) from set of hydraulic connections 1 pc.	7	Hydraulic connections from hydraulic extension set 2 pc.
4	Roof bracket type P (for pantile) (basic set) 4 pc.	8	Clamp from hydraulic extension set 4 pc.
5	Roof bracket type P (for pantile) (extension set, on top of each other) 2 pc.	9	Return (inlet) from hydraulic connections set 1 pc.
6	Roof bracket type S flat (for beaver tail, etc.) (basic set) 4 pc.	10	Top and bottom plugs (with vent opening) from set of hydraulic connections 2 pc.
7	Roof bracket type S flat (for beaver tail, etc.) (extension set, on top of each other) 2 pc.	11	Rail connector from hydraulic extension set 2 pc.
8		12	Long base, hook type P 4 pc.



- |    |  |    |   |
|----|--|----|---|
| 13 | auroTHERM VFK 145 V collector<br>1 pc.<br>auroTHERM VFK 145 H collector<br>1 pc.<br>auroTHERM VFK 150 V collector<br>1 pc.<br>auroTHERM VFK 150 H collector<br>1 pc.<br>auroTHERM VFK 155 V collector<br>1 pc.<br>auroTHERM VFK 155 H collector<br>1 pc. | 14 | Clamp from hydraulic connections set<br>4 pc.           |
|    |  | 15 | Pipe connector (only for horizontal collector)<br>1 pc. |

► Use the illustration to check that the installation sets are complete.

## 4 On-roof fitting and installation

### 4.1.1.3 Transporting collectors

1. To protect the collectors against damage, always transport them horizontally.
2. Transport the collectors to the roof using suitable aids.

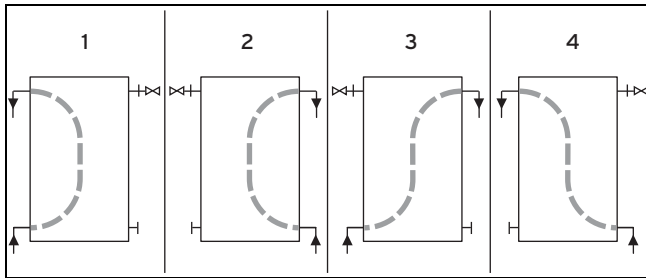
### 4.1.2 Complying with clearances and installation clearances

In order to fit the collectors correctly, the specified clearances and installation clearances must be observed.

- For the necessary edge clearances, see chapter "Defining edge clearances of the roof brackets".

### 4.1.3 Selecting suitable connection

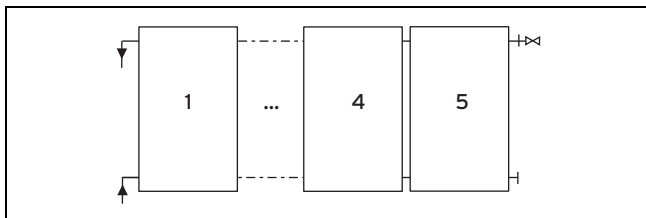
- Select the appropriate connection for the collectors.



**Fig. 4.2: Flow direction (illustrated here: vertical collector)**

- For the hydraulic connection of the collectors, select one of the four variants shown in the illustration.
- Ensure that the solar fluid always flows through the collectors from the bottom to the top.

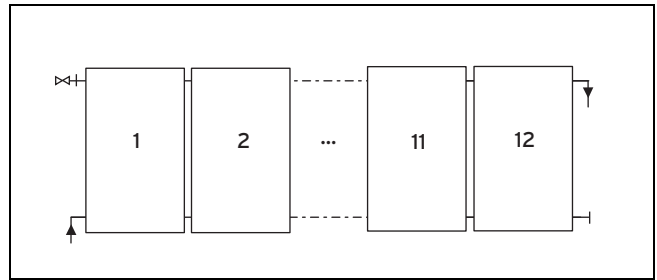
**Conditions:** Number of collectors: 1 ... 5



**Fig. 4.3: Series switching 1 - 5 collectors (shown here: vertical collector)**

- Configure the hydraulic connections on top of each other on one side.

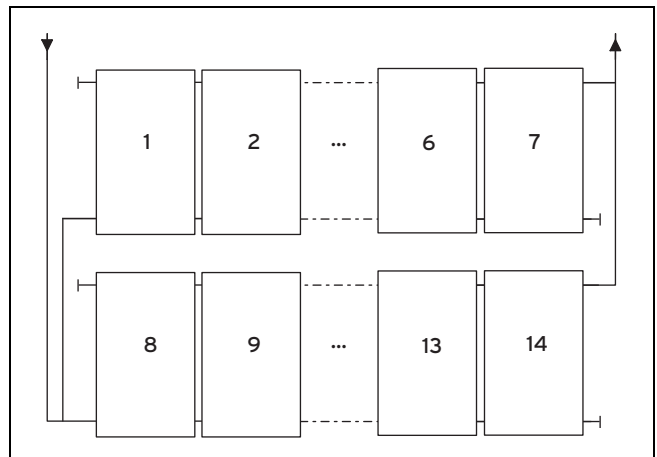
**Conditions:** Number of collectors: 6 ... 12



**Fig. 4.4: Series switching 6 - 12 collectors (shown here: vertical collector)**

- To guarantee a complete flow through the collector field, arrange the hydraulic connections diagonally.

**Conditions:** Number of collectors:  $\geq 13$



**Fig. 4.5: Parallel switching (shown here: vertical collector)**

- Always connect as many collectors as possible in series.
- Set up several parallel connector rows.
- Connect the collector rows hydraulically in parallel.
- To avoid pressure losses in the sub-collector fields, only use parallel connection for collector rows with the same number of collectors.
- Ensure that each sub-collector field has the same total pipe length in the flow and return (Tichelmann system), in order to avoid pressure losses in the connection pipes.

### 4.1.4 Preparing the roof duct

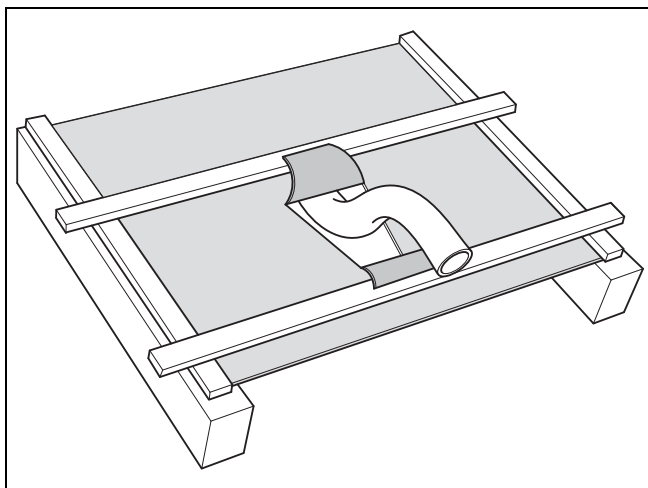


#### Caution.

#### Building damage due to penetrating water.

If the roof duct is not prepared properly, water may penetrate the building interior.

- Ensure that the roof duct is prepared properly.



**Fig. 4.6: Guiding the pipe through the roofing felt membrane**

1. Make a v-shaped cut in the roofing felt membrane.
2. Fold the upper, wider flap onto the roof batten above, and fold the lower, narrower flap onto the roof batten below.
3. Fix the roofing felt membrane tight to the roof batten, so that any moisture runs off to the side.

## 4 On-roof fitting and installation

### 4.1.5 Putting together components

**Conditions:** Array configuration: Adjacent

- Using the following table, put together the components for installation.

Collector position	Number of collectors:	1	2	3	4	5	6	7	8	9	10
	Components	Required quantity									
Horizontal	Hydraulic installation set	1									
	Hydraulic connection set	–	1	2	3	4	5	6	7	8	9
	Bracket set 1 type P	1	2	3	5	5	6	7	8	9	10
	Bracket set 2 type S										
	Bracket set 2 type S flat										
	Bracket set 3 hanger bolts										
	Horizontal rail, anodised	1	2	3	4	5	6	7	8	9	10
Vertical	Hydraulic installation set	1									
	Hydraulic connection set	–	1	2	3	4	5	6	7	8	9
	Bracket set 1 type P	1	2	3	4	5	6	7	8	9	10
	Bracket set 2 type S										
	Bracket set 2 type S flat										
	Bracket set 3 hanger bolts										
	Vertical rail, anodised	1	2	3	4	5	6	7	8	9	10

**Table 4.1: Components for on-roof installation, adjacent array configuration**

**Conditions:** Array configuration: On top of each other

- Use the following table to put together the components for installation.

Collector position	Number of collectors:	1	2	3	4	5	6	7	8	9	10
	Components	Required quantity									
Horizontal	Hydraulic installation set	1	1	–	–	–	–	–	–	–	–
	Hydraulic connection set	–	1	–	–	–	–	–	–	–	–
	Bracket set 1 type P	1	1	–	–	–	–	–	–	–	–
	Bracket set 2 type S										
	Bracket set 2 type S flat										
	Bracket set 3 hanger bolts										
	Bracket extension set 1 type P	–	1	–	–	–	–	–	–	–	–
	Bracket extension set 2 type S										
	Bracket extension set 2 type S flat										
	Bracket extension set 3 hanger screws										
	Horizontal rail, anodised	1	2	–	–	–	–	–	–	–	–
Vertical	Hydraulic installation set	1	2	–	–	–	–	–	–	–	–
	Bracket set 1 type P	1	1	–	–	–	–	–	–	–	–
	Bracket set 2 type S										
	Bracket set 2 type S flat										
	Bracket set 3 hanger bolts										
	Bracket extension set 1 type P	–	1	–	–	–	–	–	–	–	–
	Bracket extension set 2 type S										
	Bracket extension set 2 type S flat										
	Bracket extension set 3 hanger bolts										

Collector position	Number of collectors:	1	2	3	4	5	6	7	8	9	10
	Components	Required quantity									
Vertical	Vertical rail, anodised	1	2	-	-	-	-	-	-	-	-

**Table 4.2: Components for on-roof installation, array configuration on top of each other**

## 4 On-roof fitting and installation

### 4.1.6 Determining the number of required roof brackets

1. Ask the local building authority for the regional maximum snow load  $s_k$ .

**Conditions:** Maximum snow load:  $\leq 3 \text{ kN/m}^2$

- Install 4 roof brackets per collector.

**Conditions:** Maximum snow load:  $3 < s_k \leq 4.5 \text{ kN/m}^2$

- Install 6 roof brackets per collector.

**Conditions:** Maximum snow load:  $> 4.5 \text{ kN/m}^2$

- Compile statistics for the individual case.
- Ensure that the maximum permissible snow load per collector is  $5.4 \text{ kN/m}^2$ .



#### Note

The maximum permissible load per roof bracket type S/type P is:  $F_{\max} = 1.875 \text{ kN}$ .

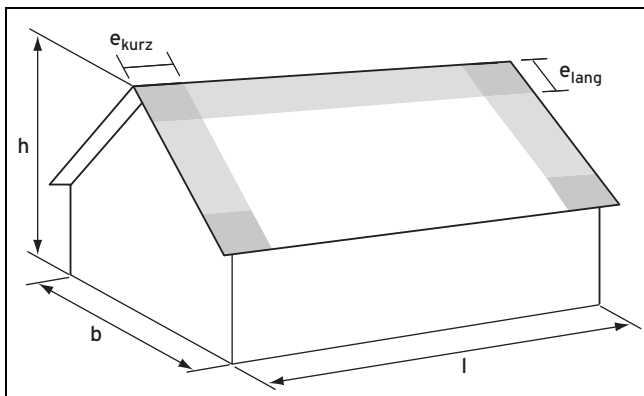
2. If you are using extension sets, ensure that the roof bracket is positioned centrally with equal clearances.

### 4.1.7 Defining the edge clearances of the roof brackets

Maximum lift points caused by wind loads can occur at the cut-away edges of wall and roof areas (e.g. verge and eaves). These maximum lift points result in high loads on the collectors and installation systems.

Areas in which lift points occur are called edge areas. Corner areas are zones in which edge areas overlap and especially high pull forces occur.

Edge and corner areas must not be used as installation areas.



**Fig. 4.7:** Edge clearances  $e_{\text{short}}$  and  $e_{\text{long}}$

- b Building width                      l Building length  
h Building height

- Calculate the building width  $w$ , building height  $h$  and building length  $l$ .
- The values for the edge clearances to be observed,  $e_{\text{short}}$  and  $e_{\text{long}}$  can be found in the following tables.

b [m]	H [m]										
	5	6	7	8	9	10	11	12	13	14	15
8	1.0										
9	1.0										
10	1.0										
11	1.0	1.1									
12	1.0	1.2									
13	1.0	1.2	1.3								
14	1.0	1.2	1.4								
15	1.0	1.2	1.4	1.5							
16	1.0	1.2	1.4	1.6							
17	1.0	1.2	1.4	1.6	1.7						
18	1.0	1.2	1.4	1.6	1.8						

**Table 4.3:** Edge clearances  $e_{\text{short}}$  [m]

l [m]	h [m]										
	5	6	7	8	9	10	11	12	13	14	15
10	1.0										
11	1.0	1.1									
12	1.0	1.2									
13	1.0	1.2	1.3								
14	1.0	1.2	1.4								
15	1.0	1.2	1.4	1.5							
16	1.0	1.2	1.4	1.6							
17	1.0	1.2	1.4	1.6	1.7						
18	1.0	1.2	1.4	1.6	1.8						
19	1.0	1.2	1.4	1.6	1.8	1.9					
20	1.0	1.2	1.4	1.6	1.8	2.0					

**Table 4.4:** Edge clearances  $e_{\text{long}}$  [m]

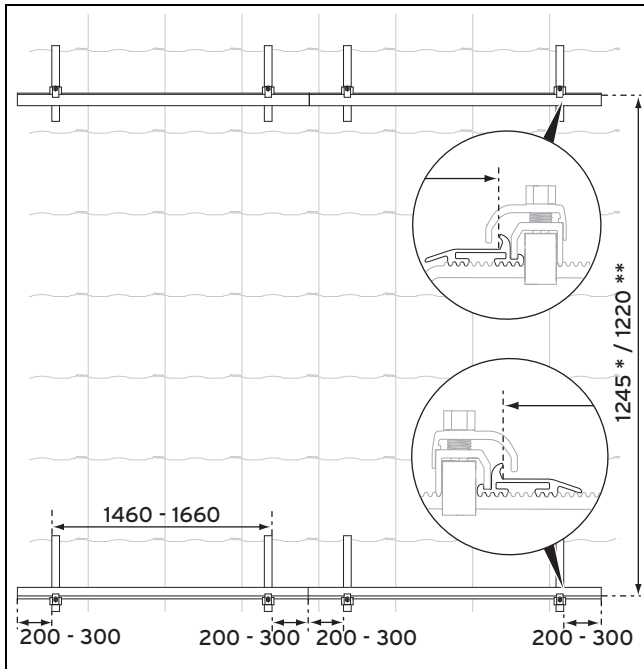
- When installing the roof brackets, observe the calculated edge clearances.

### 4.1.8 Defining the roof bracket clearances

The roof brackets have different clearances depending on the array configuration of the collectors (adjacent or on top of each other).

## 4.1.8.1 Adjacent array configuration

**Conditions:** Collector position: Horizontal

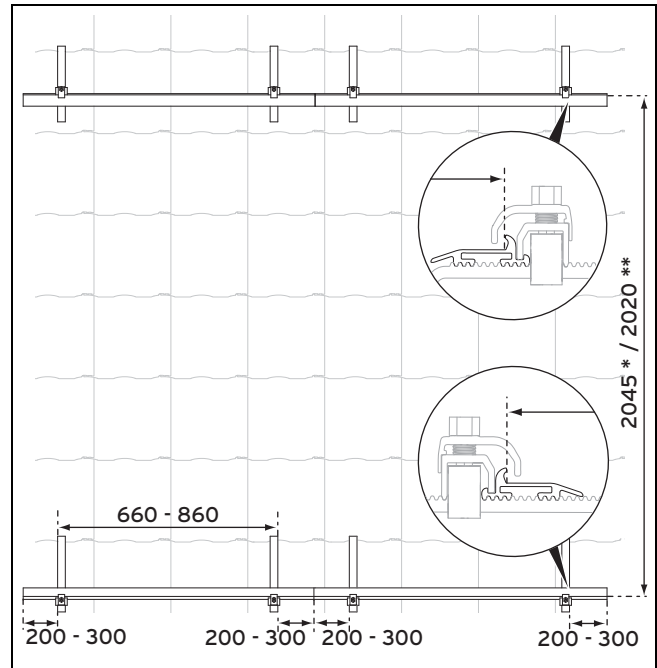


**Fig. 4.8: Clearances for adjacent array configuration and horizontal collector position**

- Define the clearances of the roof brackets.
- Ensure that the roof brackets have sufficient play.

Specifications/technical data	
Pre-installation dimension (*)	= Finished installation dimension (**) + 20-25 mm

**Conditions:** Collector position: Vertical



**Fig. 4.9: Clearances for adjacent array configuration and vertical collector position**

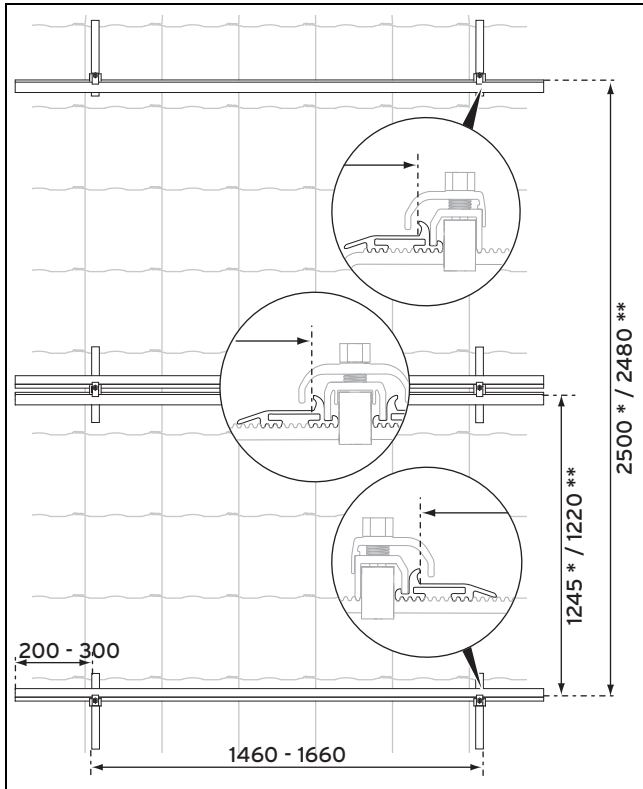
- Define the clearances of the roof brackets.

Specifications/technical data	
Pre-installation dimension (*)	= Finished installation dimension (**) + 20-25 mm

## 4 On-roof fitting and installation

### 4.1.8.2 Array configuration on top of each other

Conditions: Collector position: Horizontal



**Fig. 4.10: Clearances for array configuration on top of each other and horizontal collector position**

- Define the clearances of the roof brackets.

Specifications/technical data	
Pre-installation dimension (*)	= Finished installation dimension (**) + 20-25 mm

## 4.2 Carrying out the installation

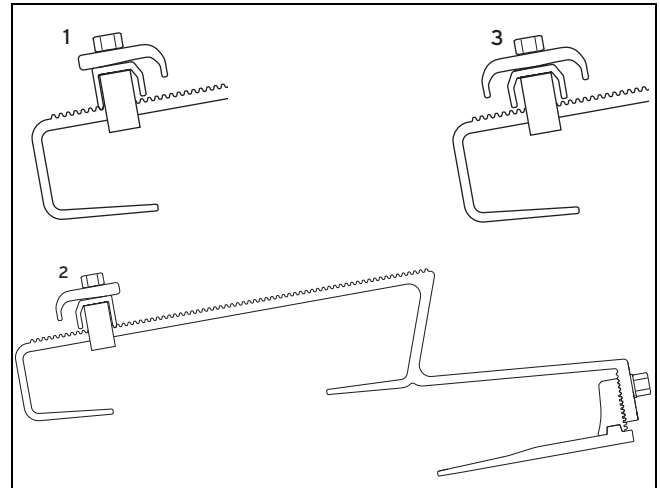
The installation steps and notes in this manual apply to both collector positions and array configurations. Any different installation steps are clearly indicated in individual cases.

### 4.2.1 Installing roof brackets

#### 4.2.1.1 Installing type P (for pantile)



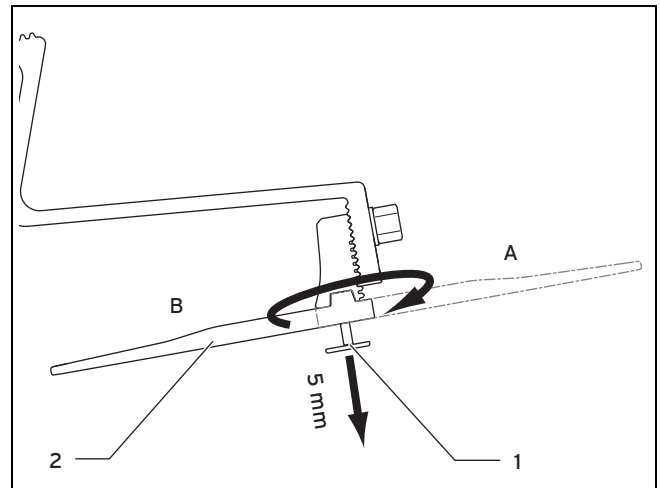
✦ SW 13 spanner



**Fig. 4.11: Roof bracket type P**

- 1 Lower roof bracket
- 2 Top roof bracket
- 3 Middle roof bracket

1. Use the top, middle and lower type P roof brackets shown.



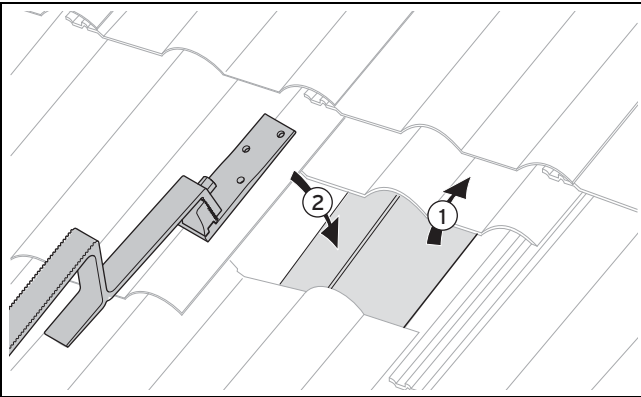
**Fig. 4.12: Turning the base**

2. Secure the type P roof bracket either to the rafters (A) or to the roof batten (B).
3. To do this, loosen the bolt (1) on the base of the roof bracket with the enclosed bit and unscrew the bolt by approx. 5 mm.
4. If you wish to secure the roof bracket onto the rafters, turn the base (2) outwards (A).



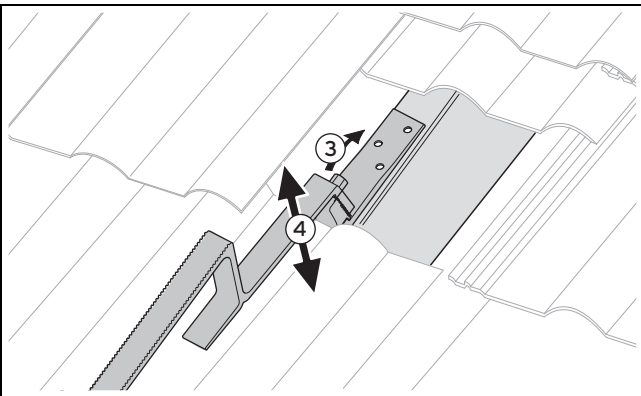
5. If you wish to secure the roof bracket onto the roof batten, turn the base **(2)** inwards **(B)**.

**Conditions:** Fastening type: To rafters



**Fig. 4.13: Exposing the rafters and fitting the type P roof bracket**

- Define the clearances of the roof brackets. (→ Page 19)
- Expose the rafters at the corresponding position **(1)**.
- Position the roof bracket **(2)**. Ensure the correct position of the top, middle and lower roof brackets.



**Fig. 4.14: Positioning the type P roof bracket correctly on the rafters**

- Undo the top bolt until the height of the roof bracket can be adjusted **(3)**.

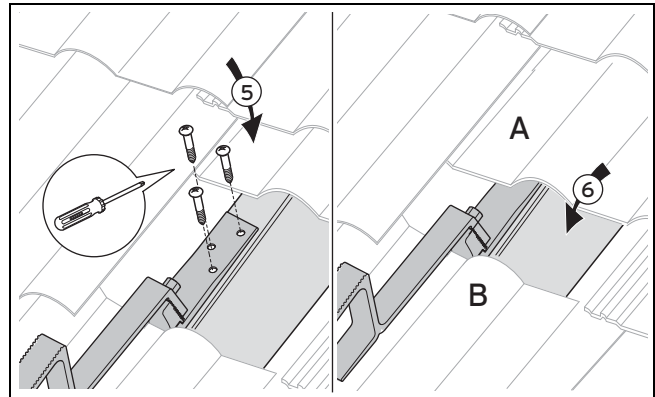
**Working materials**

SW 13 spanner

- Adjust the roof bracket to the height of the pantiles, so that the top part of the roof bracket lies on the roofing **(4)**.
- Tighten the top bolt.

**Working materials**

SW 13 spanner



**Fig. 4.15: Securing the type P roof bracket on the rafters**

- Screw the roof bracket onto the rafters using the three bolts supplied **(5)**.
- Slide the pantiles into their original position again **(6)**.
- To ensure that the tiles lie tightly together, notch guttering onto the underside **(A)** or the top side **(B)** of the pantile using a hammer, if necessary.

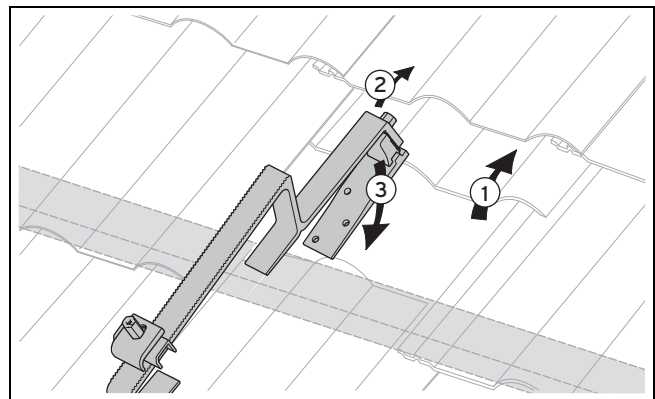


**Note**

For some roof types, it may be necessary to offset the roof bracket laterally opposite the rafters.

To do this, use the accessory "long base" article number 0020080177 (not available in all countries).

**Conditions:** Fastening type: To roof batten



**Fig. 4.16: Exposing the roof batten and fitting the type P roof bracket**

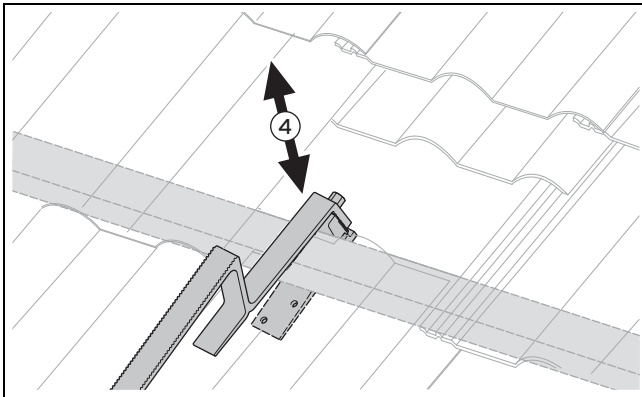
- Define the clearances of the roof brackets. (→ Page 19)
- Slide one to two pantiles upwards at the corresponding position above the roof batten **(1)**.
- Undo the top bolt until the height of the roof bracket can be adjusted **(2)**.

**Working materials**

SW 13 spanner

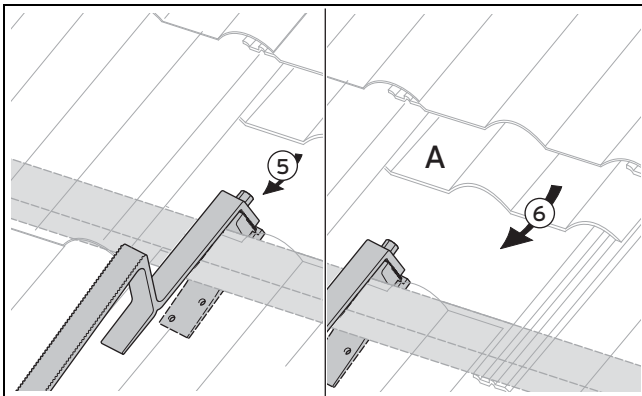
## 4 On-roof fitting and installation

- Hang the roof bracket on the roof batten (3). Ensure that the top, middle and lower roof brackets are positioned correctly.



**Fig. 4.17: Positioning the type P roof bracket correctly on the roof batten**

- Adjust the roof bracket to the height of the pantiles, so that the top part lies on the roofing and the bottom part is pushed tight against the roof batten from the bottom (4).
- Ensure that the roof bracket fits securely around the roof batten and pantile when it engages.



**Fig. 4.18: Securing the type P roof bracket on the roof batten**

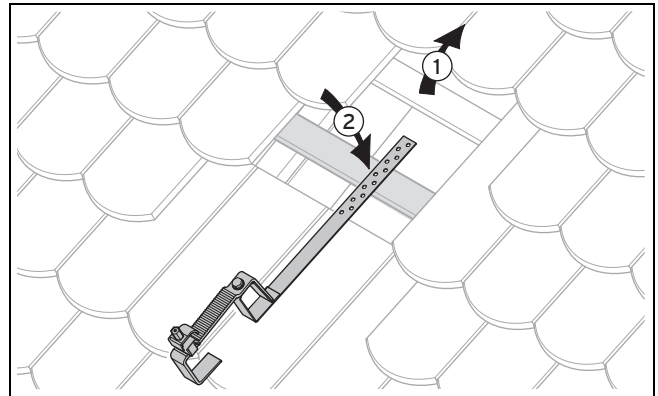
- Tighten the top bolt (5).

### Working materials

SW 13 spanner

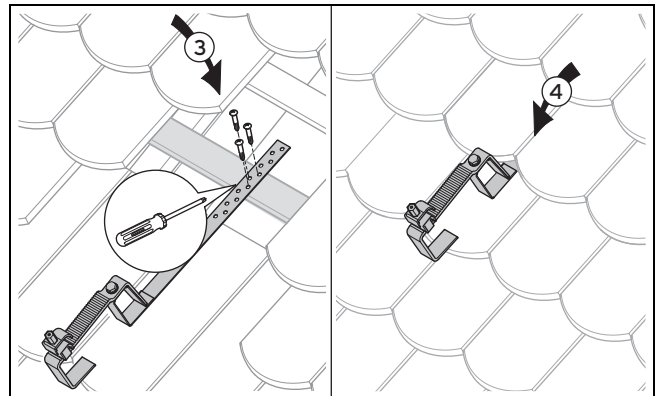
- Slide the pantiles into their original position again (6).
- To ensure that the tiles lie tightly together, notch guttering onto the underside of the pantiles (A) using a hammer, if necessary.

### 4.2.1.2 Installing type S (for slate)



**Fig. 4.19: Remove slates and fit type S roof bracket (shown here: on the roof batten)**

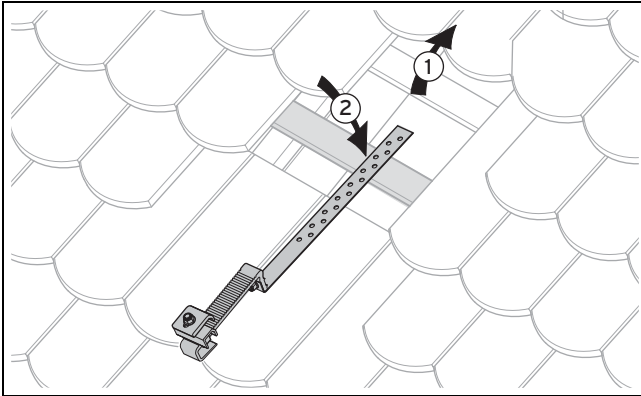
1. Define the clearances of the roof brackets. (→ Page 19)
2. At the appropriate position, expose the rafters or roof batten (1).
3. Position the roof bracket. Ensure the correct position of the top, middle and lower roof brackets (2).



**Fig. 4.20: Screw on the type S roof bracket and lay the slates again (shown here: on the roof batten)**

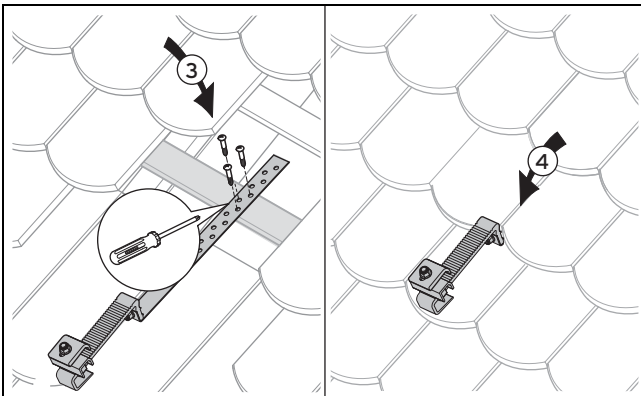
4. Screw the roof bracket onto the roof batten or rafters using the three screws supplied (3).
5. Slide the pantiles into their original position again (4).

## 4.2.1.3 Installing type S flat (for slate)



**Fig. 4.21: Remove slates and fit the type S flat roof bracket (shown here: on the roof batten)**

1. Define the clearances of the roof brackets. (→ Page 19)
2. At the appropriate position, expose the rafters or roof batten **(1)**.
3. Position the roof bracket. Ensure that the top, middle and lower roof brackets **(2)** are positioned correctly.



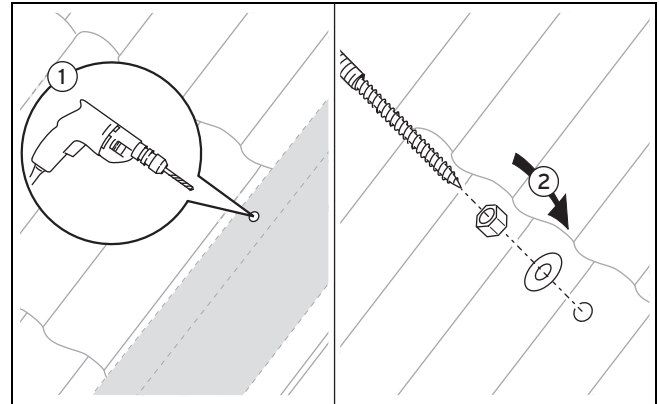
**Fig. 4.22: Screw on the type S flat roof bracket and lay the slates again (shown here: on the roof batten)**

4. Screw the roof bracket onto the roof batten or rafters using the three screws supplied **(3)**.
5. Slide the pantiles into their original position again **(4)**.

## 4.2.1.4 Installing the hanger bolt type

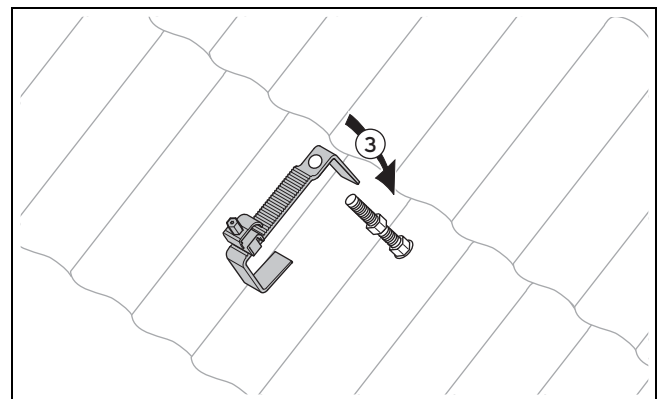


✦ SW 17 spanner



**Fig. 4.23: Defining the position of the roof bracket on the rafters**

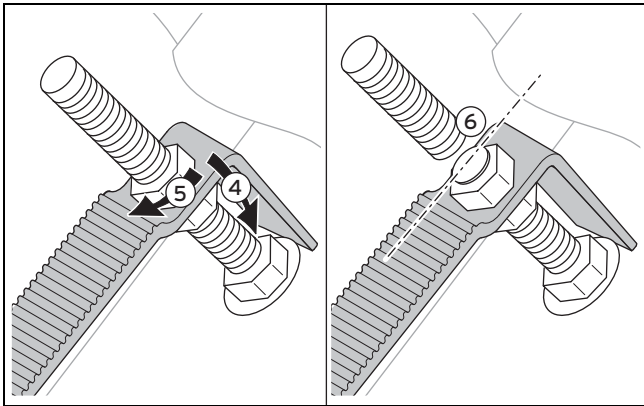
1. Define the clearances of the roof brackets. (→ Page 19)
2. At the corresponding position, drill a hole in the pantile **(1)**.
3. Tighten the hanger bolt onto the rafters through the pantile **(2)**.



**Fig. 4.24: Tightening the nut, fitting the roof bracket**

4. Position the central nut so that, after inserting the upper part of the roof bracket, the front contact area lies on the roofing **(3)**. Ensure the correct positioning of the top, middle and lower roof brackets.

## 4 On-roof fitting and installation



**Fig. 4.25: Adjusting the roof bracket; cutting off the threaded rod**

5. Position the roof bracket on the central nut **(4)**.
6. Screw the second nut on and tighten **(5)**.

### Working materials

SW 17 spanner

7. Disconnect the threaded rod directly above the nut **(6)**.
8. Deburr the interface.

### 4.2.2 Installing collectors

#### 4.2.2.1 Adjacent array configuration



✦ SW 13 spanner



#### **Danger!**

**Personal injury and material damage due to a falling collector.**

Improper fastening may cause a collector to fall.

- ▶ Tighten the clamping elements.
- ▶ Check for proper tensioning by shaking the clamping blocks.
- ▶ If a clamping block is mobile, tighten the nut again.

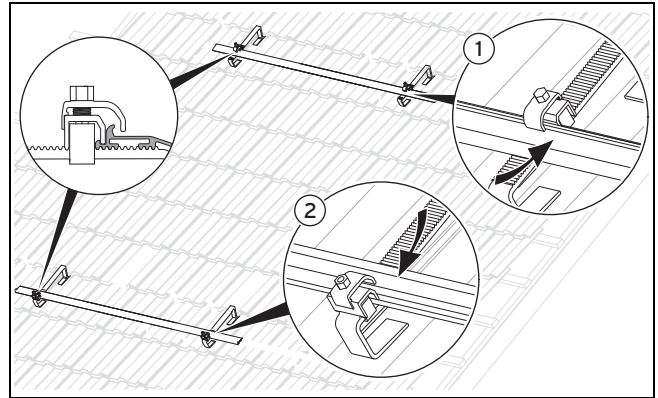
1. Install the collectors on the roof as specified in the following sections.



#### **Note**

Mounting rails and clamping elements cannot be moved at the same time.

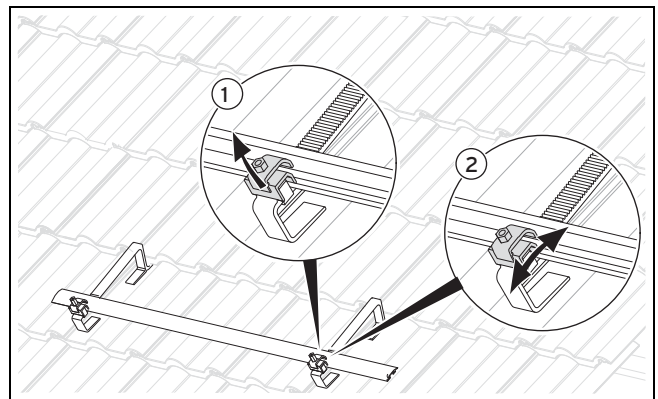
### Installing mounting rails



**Fig. 4.26: Installing mounting rails**

2. Use the clamping elements to secure the top and lower mounting rail for the first collector to the roof brackets **(1)** and **(2)**.
3. Position the lower rail as far as possible downwards on the roof brackets.
4. Position the top rail on the roof brackets with the pre-installation clearance dimension from the lower rail (→ chapter "Defining roof bracket clearances").

### Taring mounting rails



**Fig. 4.27: Taring mounting rails**

5. Secure the mounting rails horizontally.
6. Compensate for any height differences by moving the clamping elements.
7. To do this, pull the clamping element upwards **(1)**, move it **(2)** and release it so that it engages.

## Laying and hooking collectors

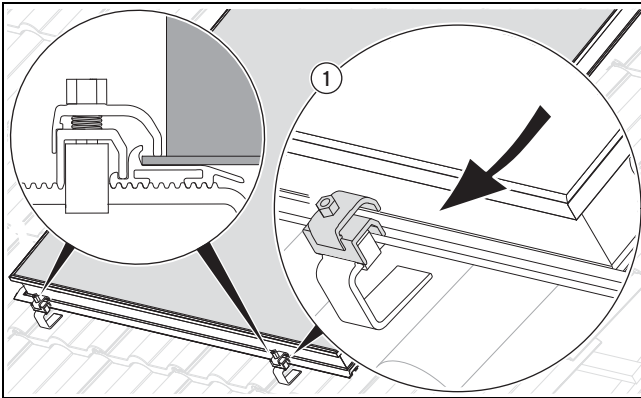


Fig. 4.28: Laying and hooking collectors



### **Danger!** **Risk of burns and scalding!**

In the event of solar radiation inside the units, collectors can reach 200 °C.

- ▶ Avoid working in direct sunlight.
- ▶ Cover the collectors before starting work.
- ▶ You should preferably perform the work in the morning.
- ▶ Wear suitable safety gloves.

8. Lay the lower edge of the first collector in the lower mounting rail and hook it in at the clamping elements (1).
9. Ensure that the top clamping block of the clamping element is positioned above the edge of the collector.
10. Tighten the clamping elements of the lower mounting rail.

#### **Working materials**

SW 13 spanner

## Fitting connectors

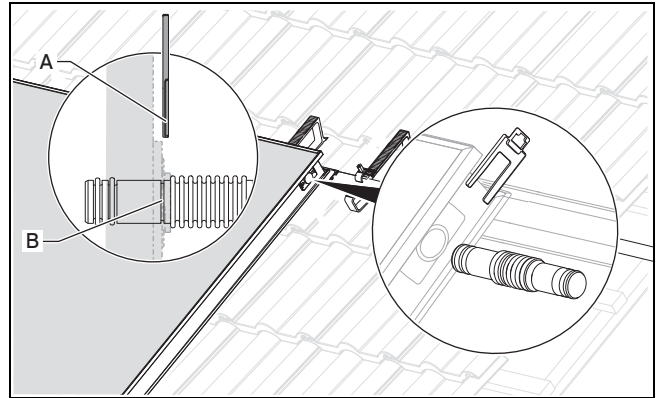


Fig. 4.29: Fitting connectors



### **Caution.** **Risk of damage to the collector.**

Improper installation of the pipe connectors may damage the collector.

- ▶ Ensure that the clamps (A) slide into the grooves of the pipe connector (B).

11. Insert the hydraulic connectors into the provided mounting openings at the side of the previously installed collector until they reach the stop position.
12. Secure the connectors with the clamps, slide the clamp into the guide from the top for the top connection and from the bottom for the lower connection.

## Connecting mounting rails

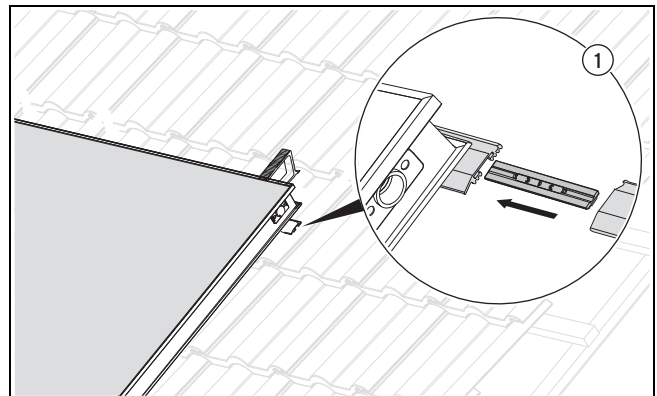


Fig. 4.30: Connecting mounting rails

13. Insert the connecting elements laterally into the mounting rails until you feel them engage (1).
14. Slide the mounting rails of the next collector onto the mounting rails of the previously installed collector (1).
15. Secure the mounting rails for the next collector onto the roof brackets using the clamping elements.
16. Tare the mounting rails. (→ Page 24)



## 4 On-roof fitting and installation

### Installing additional collectors

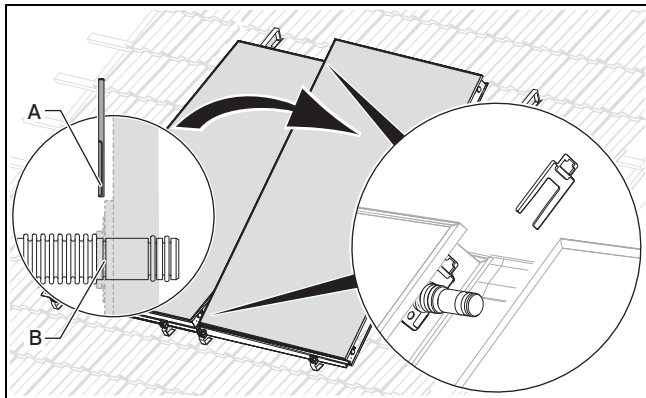


Fig. 4.31: Installing additional collectors

17. Lay the lower edge of the next collector in the lower mounting rail and hook it in at the clamping elements.
18. Ensure that the top clamping block of the clamping element is above the edge of the collector.
19. Slide the collector to the first collector, observing the hydraulic connectors.



#### Caution.

#### Risk of damage to the collector.

Improper installation of the pipe connectors may damage the collector.

- Ensure that the clamps (A) slide into the grooves of the pipe connector (B).

20. Secure the hydraulic connectors with the clamps.
21. Tighten the clamping elements of the lower mounting rail.

#### Working materials

SW 13 spanner

### Completing collector rows

**Conditions:** Not all collectors of a row have been installed yet.

- Fit the connectors. (→ Page 25)
- Connect the mounting rails. (→ Page 25)
- Install an additional collector. (→ Page 26)

### Positioning the top mounting rails

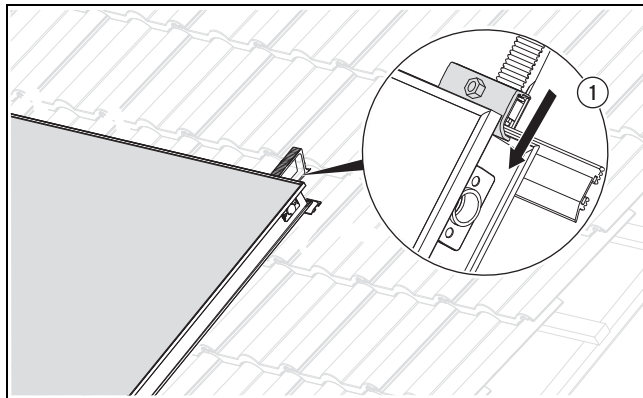


Fig. 4.32: Positioning the top mounting rails

22. Slide all the top mounting rails until they are flush with the lower collectors, one after the other (1).
23. Ensure that the edges of the mounting rails grip around the collectors.
24. Slide the clamping elements down to the lower collectors, one after the other (1).
25. Ensure that the clamping block of the clamping elements lies over the collector edges.
26. Tighten the clamping elements of the top mounting rails.

#### Working materials

SW 13 spanner

### Completing installation of the collectors

27. Tighten all remaining clamping elements.

#### Working materials

SW 13 spanner

28. Check for proper tensioning by shaking the clamping blocks.
29. If a clamping block can be moved, tighten the nut again.

## 4.2.2.2 Array configuration on top of each other



✦ SW 13 spanner



### **Danger!**

**Personal injury and material damage due to a falling collector.**

Improper fastening may cause a collector to fall.

- ▶ Tighten the clamping elements.
- ▶ Check for proper tensioning by shaking the clamping blocks.
- ▶ If a clamping block is mobile, tighten the nut again.

1. Install the collectors on the roof as specified in the following sections.



### **Note**

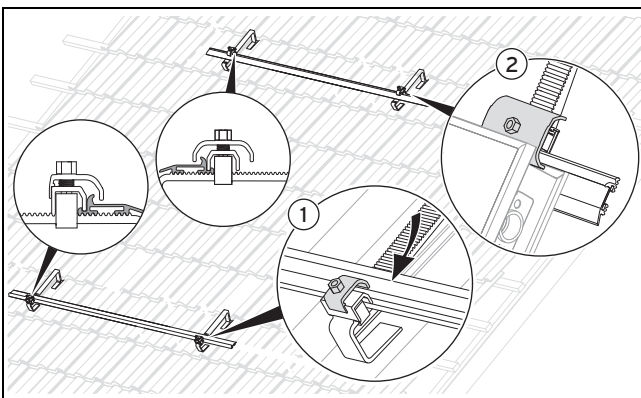
Mounting rails and clamping elements cannot be moved at the same time.



### **Note**

With array configuration on top of each other and with a vertical collector position, the collectors must be hydraulically balanced (Tichelmann System).

## Installing mounting rails

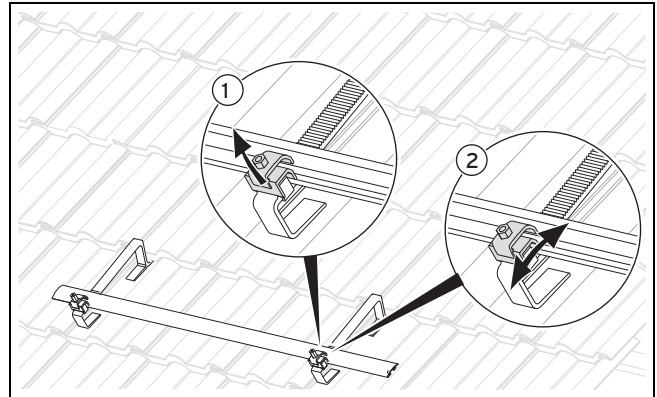


**Fig. 4.33: Installing mounting rails**

2. Use the clamping elements to secure the top and lower mounting rail for the first collector to the roof brackets ((1) and (2)).
3. Position the lower rail as far as possible downwards on the roof brackets.

4. Position the top rail on the roof brackets with the pre-installation clearance dimension from the lower rail (→ chapter "Defining clearances of the roof brackets").

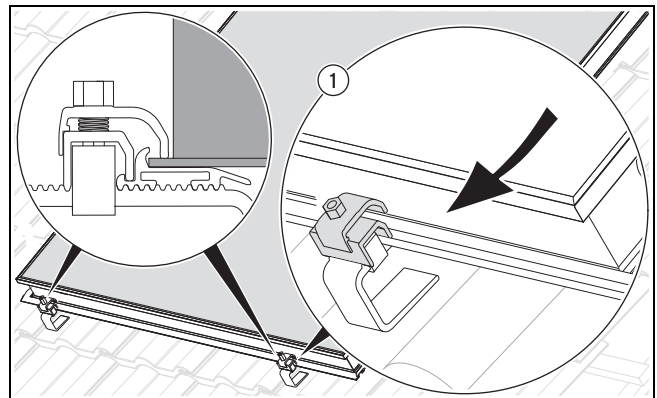
## Taring mounting rails



**Fig. 4.34: Taring mounting rails**

5. Secure the mounting rails horizontally.
6. Compensate for any height differences by moving the clamping elements.
7. To do this, pull the clamping element upwards (1), move it (2) and release it so that it engages.

## Laying and hooking collectors



**Fig. 4.35: Laying and hooking collectors**



### **Danger!**

**Risk of burns and scalding!**

In the event of solar radiation inside the units, collectors can reach 200 °C.

- ▶ Avoid working in direct sunlight.
- ▶ Cover the collectors before starting work.
- ▶ You should preferably perform the work in the morning.
- ▶ Wear suitable safety gloves.

8. Lay the lower edge of the first collector in the lower mounting rail and hook it in at the clamping elements (1).

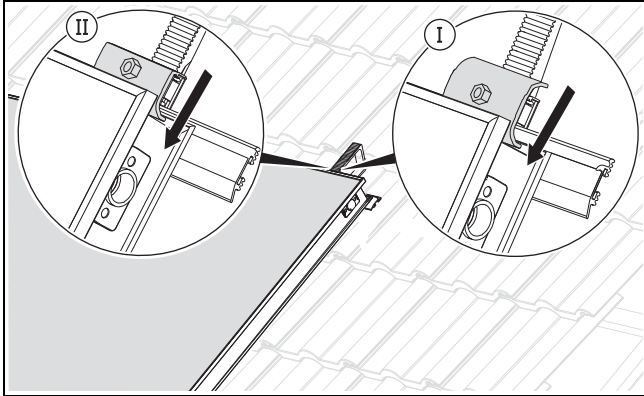
## 4 On-roof fitting and installation

9. Ensure that the top clamping block of the clamping element is positioned above the edge of the collector.
10. Tighten the clamping elements of the lower mounting rail.

### Working materials

SW 13 spanner

### Positioning the top mounting rail



**Fig. 4.36: Positioning the top mounting rail**

11. Slide the top mounting rail until it is flush with the collector.
12. Ensure that the edge of the mounting rail grips around the collector.

**Conditions:** The last installed collector is not the top collector of a column.

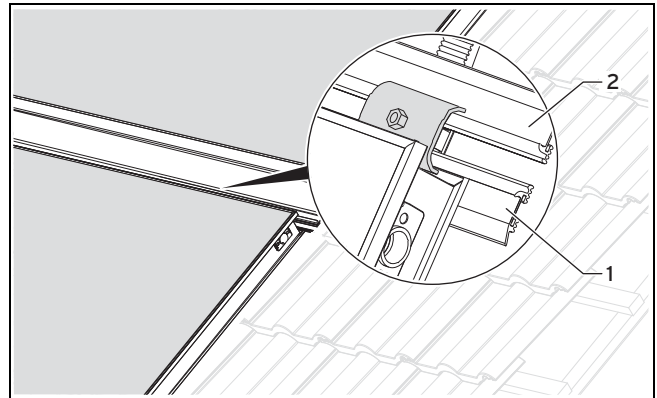
- ▶ Slide the appropriate clamping elements onto the mounting rail **(I)**.
- ▶ Ensure that the clamping block of the clamping elements lies over the collector edge.

**Conditions:** The last installed collector is the top collector of a column.

- ▶ Slide the appropriate clamping elements onto the mounting rail **(II)**.
- ▶ Ensure that the clamping block of the clamping elements lies over the collector edge.

### Installing the next collector

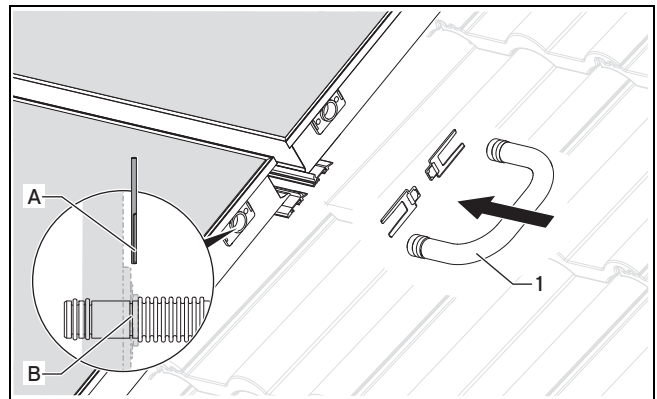
**Conditions:** Not all collectors of a column have been installed yet.



**Fig. 4.37: Mounting rails between two collectors**

- ▶ Repeat all installation steps with the next higher collector.
- ▶ Ensure that both mounting rails are installed between the collectors as shown in the illustration **(1)** and **(2)**.
- ▶ Ensure that the clamping blocks between the collectors grip around both mounting rails.

### Fitting connectors



**Fig. 4.38: Fitting connectors**

13. Connect the collectors with the pipe connectors **(1)**.



### Caution.

#### Risk of damage to the collector.

Improper installation of the pipe connectors may damage the collector.

- ▶ Ensure that the clamps **(A)** slide into the grooves of the pipe connector **(B)**.

14. Secure the pipe connectors with the clamps.

### Completing installation of the collectors

15. Tighten all remaining clamping elements.

### Working materials

SW 13 spanner



16. Check for proper tensioning by shaking the clamping blocks.
17. If a clamping block can be moved, tighten the nut again.

## 4.2.3 Installing hydraulic connections



### **Caution.** **Lack of tightness due to incorrect accessories.**

Incorrect accessories may result in lack of tightness of the solar circuit and cause material damage.

- ▶ Only work in the solar circuit with hard soldered connections, flat seals, compression fittings or press fittings which have been approved by the manufacturer for use in solar circuits and at correspondingly high temperatures.

The hydraulic connections must be installed differently according to the array configuration of the collectors (adjacent or on top of each other).

### 4.2.3.1 Adjacent array configuration

1. Install the hydraulic connections on the collectors, as specified in the following sections.

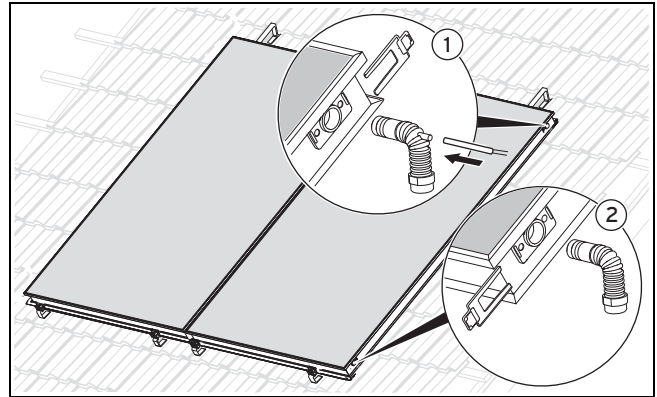


#### **Note**

If you connect six or more collectors one behind the other, you must arrange the hydraulic connections diagonally in order to force complete flow.

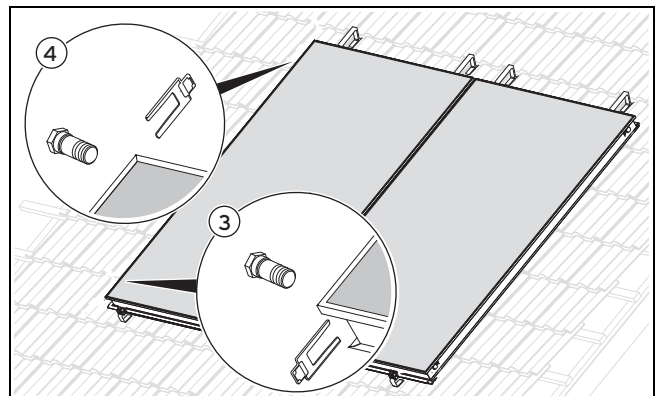
If you connect six or more collectors one behind the other, you must arrange the hydraulic connections diagonally in order to force complete flow. (→ Page 14)

**Conditions:** Number of collectors: 1 ... 5



**Fig. 4.39: Installing the flow/return and collector sensor**

- ▶ Connect the flow (outlet with opening for collector sensor) at the top **(1)**.
- ▶ Secure the flow with the clamp **(1)**.
- ▶ Remove the red plug from the opening for the collector sensor.
- ▶ Insert the **VR 11** collector sensor into the opening **(1)**.
- ▶ Use a cable tie to secure the **VR 11** collector sensor against slipping out.
- ▶ Connect the return (inlet) at the bottom **(2)**.
- ▶ Secure the return with the clamp **(2)**.

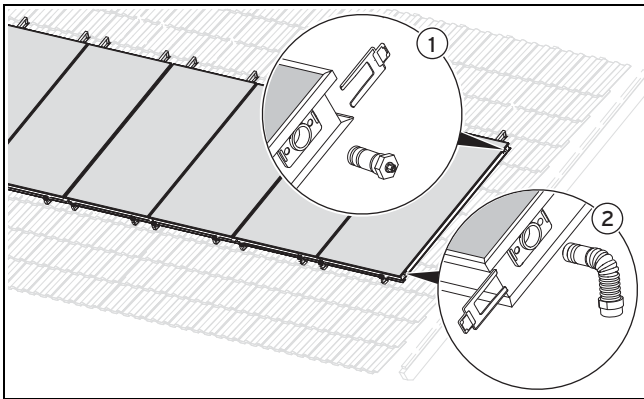


**Fig. 4.40: Installing plugs with vent openings**

- ▶ Install the two plugs with vent openings on the other side of the collector field at the top and bottom of the collector **((3) and (4))**.
- ▶ Secure the two plugs with the clamps **((3) and (4))**.
- ▶ Connect the collector flow and return to the system with the connection pipes.
- ▶ Check the connections for tightness.

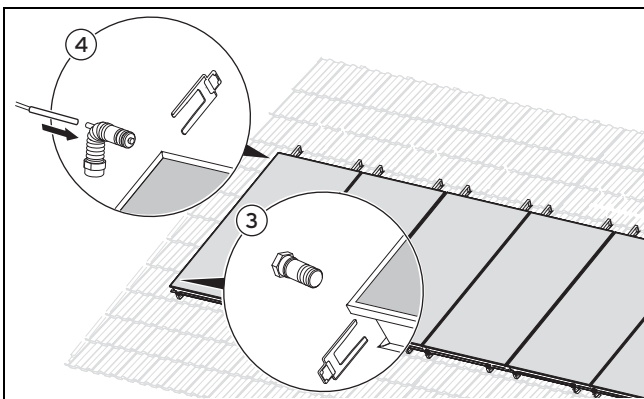
## 4 On-roof fitting and installation

**Conditions:** Number of collectors:  $\geq 6$



**Fig. 4.41: Installing the return and the first plug**

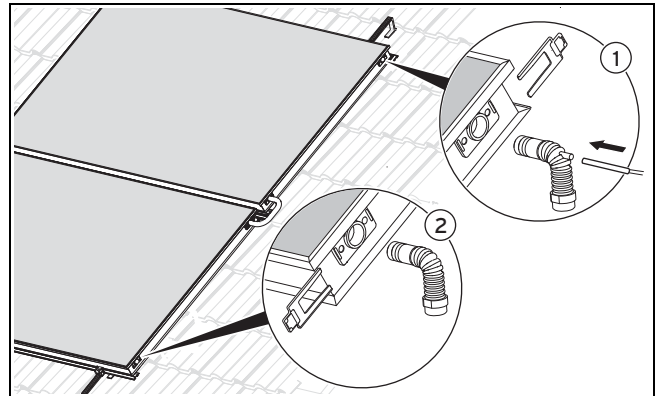
- ▶ Insert the return (inlet) on one side in the lower lateral opening **(2)**.
- ▶ Secure the return with the clamp **(2)**.
- ▶ Install the first plug with vent opening at the top lateral opening **(1)**.
- ▶ Secure the first plug with the clamp **(1)**.



**Fig. 4.42: Installing the flow, second plug and collector sensor**

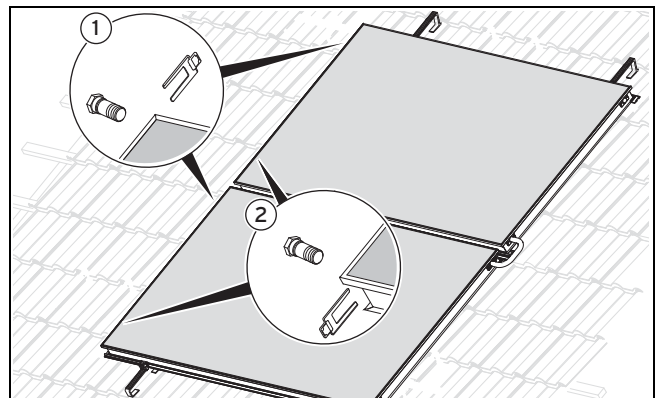
- ▶ Insert the flow (outlet with opening for collector sensor) diagonally opposite into the top lateral opening **(4)**.
- ▶ Secure the flow with the clamp **(4)**.
- ▶ Remove the red plug from the opening for the collector sensor.
- ▶ Insert the **VR 11** collector sensor into the opening **(4)**.
- ▶ Use a cable tie to secure the **VR 11** collector sensor against slipping out.
- ▶ Install the second plug with vent opening at the lower lateral opening **(3)**.
- ▶ Secure the second plug with the clamp **(3)**.
- ▶ Connect the collector flow and return to the system with the connection pipes.
- ▶ Check the connections for tightness.

### 4.2.3.2 Array configuration on top of each other



**Fig. 4.43: Installing the flow, return and collector sensor**

1. Connect the flow (outlet) at the top collector **(1)**.
2. Remove the red plug from the opening for the collector sensor.
3. Insert the **VR 11** collector sensor into the opening **(1)**.
4. Use a cable tie to secure the collector sensor **VR 11** against slipping out.
5. Secure the flow with the clamp **(1)**.
6. Connect the return (inlet) at the lower collector **(2)**.
7. Secure the return with the clamp **(2)**.



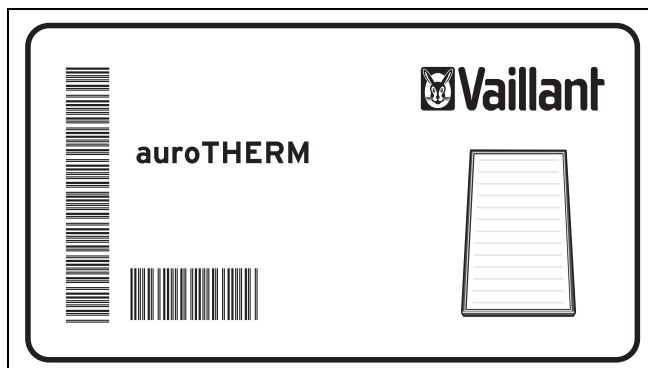
**Fig. 4.44: Installing plugs with vent openings**

8. At the opposite side of each collector, install the two plugs with the vent openings **(1)** and **(2)**.
9. Secure all four plugs with the clamps **(1)** and **(2)**.
10. Connect the collector flow and return to the system with the connection pipes.
11. Check the connections for tightness.

## 4.3 Completing and checking the installation

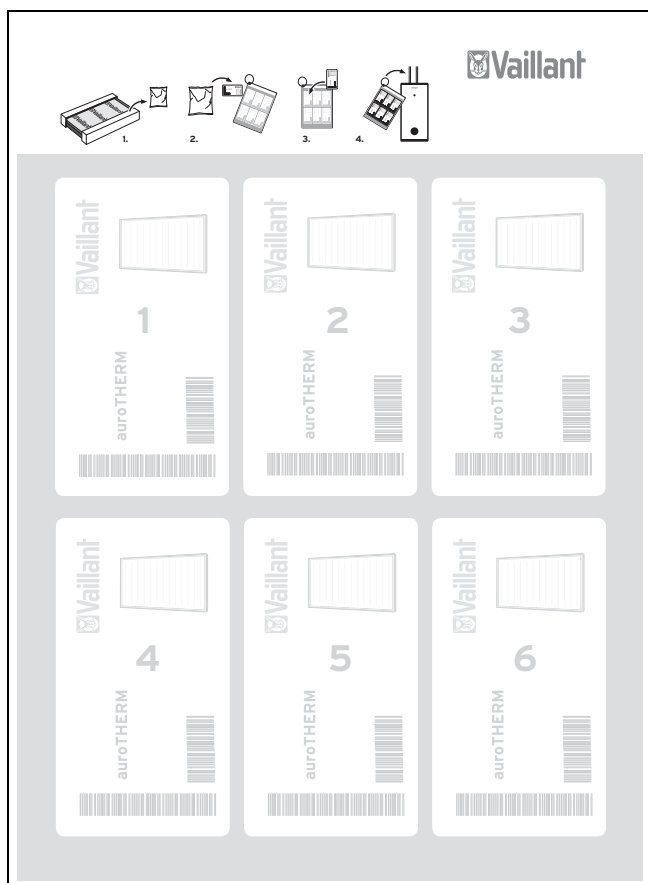
### 4.3.1 Using the customer service card

1. Remove the packaging with the serial number sticker from the transport packaging of the collector.
2. Remove the serial number sticker from the packaging.



**Fig. 4.45: Serial number sticker for customer service card**

3. Remove the customer service card from the hydraulic installation set.



**Fig. 4.46: Customer service card**

4. Stick the sticker onto the first field in the customer service card.
5. Secure the customer service card in an easily visible place near the solar system cylinder.

# 4 On-roof fitting and installation

## 4.3.2 Checking the installation

Use the following checklist to ensure that all work steps have been performed.



**Note**  
After initial start-up, and in seasons with significant ambient temperature fluctuations, condensate may form in the collector. This is normal.



**Note**  
Reflections caused by irregularities of the glass are typical of the material.

Operations	Yes	No	Comments
All hydraulic connections secured with clamps	<input type="checkbox"/>	<input type="checkbox"/>	
Hydraulic connections routed correctly	<input type="checkbox"/>	<input type="checkbox"/>	
Collector sensor <b>VR 11</b> connected	<input type="checkbox"/>	<input type="checkbox"/>	
All clamping elements tightened	<input type="checkbox"/>	<input type="checkbox"/>	
Collectors connected to lightning protection device (Optionally for lightning protection device)	<input type="checkbox"/>	<input type="checkbox"/>	
Pressure testing performed (Ideally with compressed air)	<input type="checkbox"/>	<input type="checkbox"/>	
All connections tight	<input type="checkbox"/>	<input type="checkbox"/>	

	<b>Date</b>	<b>Signature</b>
All installation work has been performed correctly.	_____._____.____.	_____

### **4.3.3 Disposing of the packaging**

The transport packaging consists largely of recyclable materials.

- ▶ Observe the applicable regulations.
- ▶ Dispose of the transport packaging properly.

## 5 Flat roof fitting and installation

### 5 Flat roof fitting and installation

- When fitting and installing the collectors, you must observe the chapter "Safety".

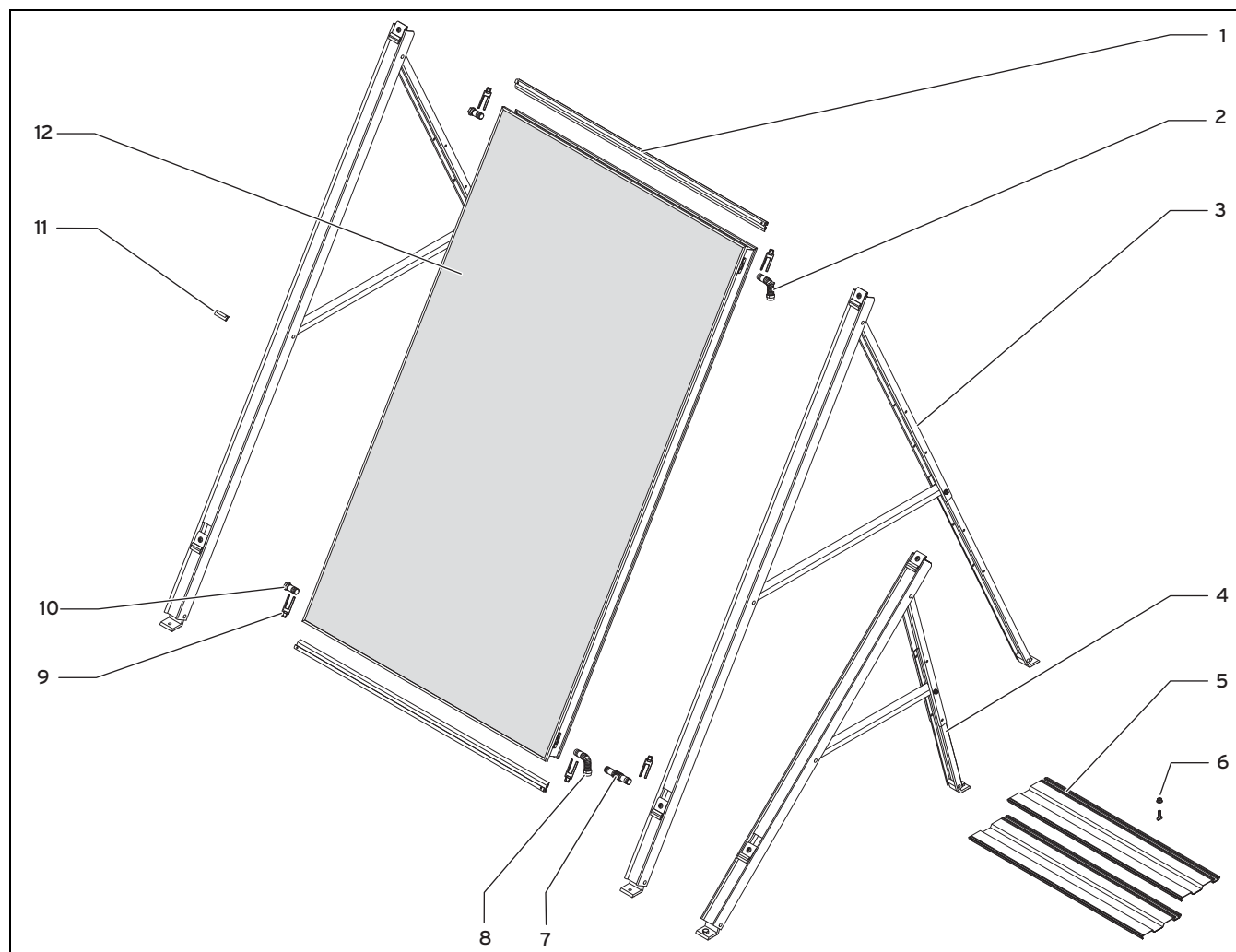
#### 5.1 Preparing for fitting and installation

##### 5.1.1 Delivery, transport and positioning

###### 5.1.1.1 Storing collectors

- To prevent moisture from penetrating into the collector, always store the collectors dry and in a weatherproof area.

## 5.1.1.2 Checking the scope of delivery



**Fig. 5.1: Installation set for flat roof installation (here: vertical collector)**

### List of materials for flat roof installation

- |   |  |    |  |
|---|--|----|--|
| 1 | Rail mounting set, vertical<br>2 pc.<br>Rail mounting set, horizontal<br>2 pc.             | 9  | Clamp from hydraulic connections set<br>4 pc.  |
| 2 | Flow (outlet with opening for collector sensor) from set of hydraulic connections<br>1 pc. | 10 | Top and bottom plugs (with vent opening) from set of hydraulic connections<br>2 pc.  |
| 3 | Frame set, vertical base<br>1 pc.  | 11 | Rail connector from frame set  |
| 4 | Frame set, horizontal base<br>1 pc.  | 12 | auroTHERM VFK 145 V collector<br>1 pc.<br>auroTHERM VFK 145 H collector<br>1 pc.<br>auroTHERM VFK 150 V collector<br>1 pc.<br>auroTHERM VFK 150 H collector<br>1 pc.<br>auroTHERM VFK 155 V collector<br>1 pc.<br>auroTHERM VFK 155 H collector<br>1 pc. |
| 5 | Load plates from load plate set<br>1 pc.   |    |  |
| 6 | Clamp from hydraulic connections set<br>4 pc.  |    |  |
| 7 | Hydraulic connections from hydraulic extension set<br>2 pc.                                |    |  |
| 8 | Return (inlet) from hydraulic connections set<br>1 pc.                                     |    |  |

► Use the image to check that the installation sets are complete.

## 5 Flat roof fitting and installation

### 5.1.1.3 Transporting collectors

1. To protect the collectors against damage, always transport them horizontally.
2. Transport the collectors to the roof using suitable aids.

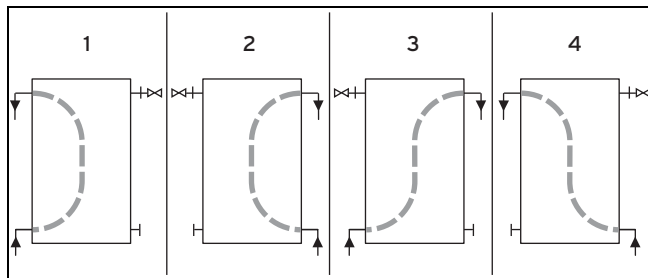
### 5.1.2 Complying with clearances and installation clearances

During storms, strong wind forces occur along the edges of flat roofs.

- When defining the installation position, maintain an edge clearance of at least 1 m from the roof edge.

### 5.1.3 Selecting suitable connection

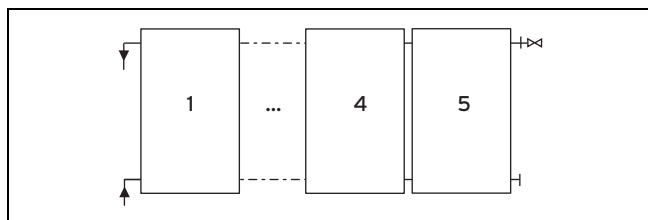
- Select the appropriate connection for the collectors.



**Fig. 5.2: Flow direction (illustrated here: vertical collector)**

- For the hydraulic connection of the collectors, select one of the four variants shown in the illustration.
- Ensure that the solar fluid always flows through the collectors from the bottom to the top.

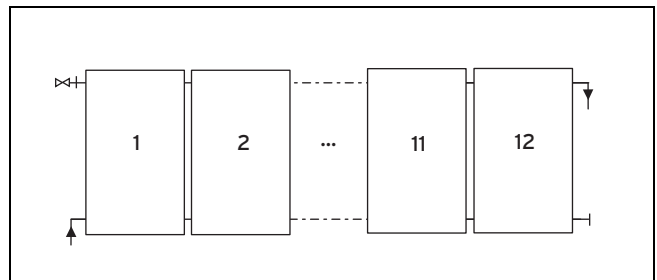
**Conditions:** Number of collectors: 1 ... 5



**Fig. 5.3: Series switching 1 - 5 collectors (shown here: vertical collector)**

- Configure the hydraulic connections on top of each other on one side.

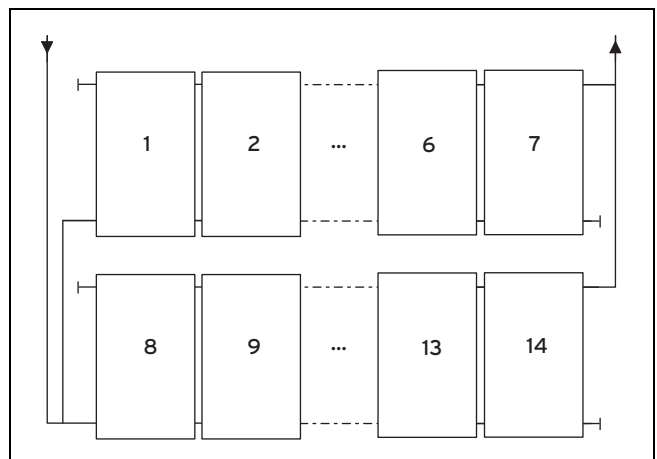
**Conditions:** Number of collectors: 6 ... 12



**Fig. 5.4: Series switching 6 - 12 collectors (shown here: vertical collector)**

- To guarantee a complete flow through the collector field, arrange the hydraulic connections diagonally.

**Conditions:** Number of collectors:  $\geq 13$



**Fig. 5.5: Parallel switching (shown here: vertical collector)**

- Always connect as many collectors as possible in series.
- Set up several parallel collector rows.
- Connect the collector rows hydraulically in parallel.
- To avoid pressure losses in the sub-collector fields, only use parallel connection for collector rows with the same number of collectors.
- Ensure that each sub-collector field has the same total pipe length in the flow and return (Tichelmann system), in order to avoid pressure losses in the connection pipes.



### 5.1.4 Preparing the roof duct



**Caution.**

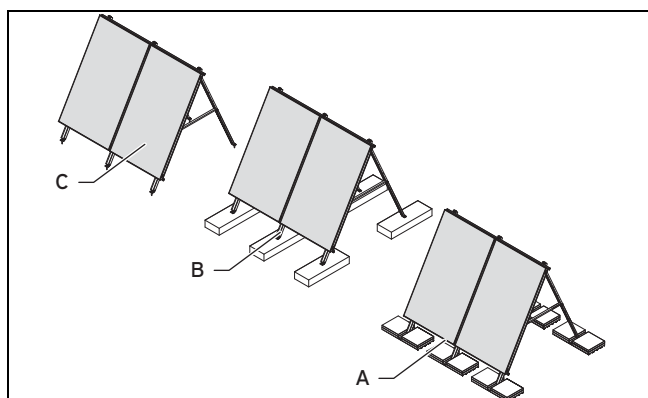
**Lack of tightness due to destruction of the roof skin.**

In the event of destruction of the roof skin, water may penetrate the building.

- ▶ Ensure adequate protection of the roof skin during installation on roof sealing surfaces.
- ▶ Place large-area building protection mats underneath the installation system.
- ▶ After installation, check the tightness of the building shell where there are directly connected racks.

- ▶ Commission a roofer to prepare the roof duct.

### 5.1.5 Selecting the installation variant



**Fig. 5.6: Flat roof installation variants**

- ▶ Make a selection from the three available installation variants:

Installation variants	Meaning
<b>A</b>	Floating installation with load plates and load weights.
<b>B</b>	Floating installation without load plates. The rack must be screwed onto suitable load weights.
<b>C</b>	Rack screwed directly onto the roof.

**Table 5.1: Flat roof installation variants**

## 5 Flat roof fitting and installation

### 5.1.6 Putting together components

- Use the following table to put together the components for installation.

Collector position	Number of collectors:	1	2	3	4	5	6	7	8	9	10
	Components	Required quantity									
Horizontal	Load plate set (optional)	2	3	4	5	6	7	8	9	10	11
	Hydraulic installation set	1									
	Hydraulic connection set	–	1	2	3	4	5	6	7	8	9
	Horizontal rack	2	3	4	5	6	7	8	9	10	11
	Horizontal rail, aluminium	1	2	3	4	5	6	7	8	9	10
Vertical	Load plate set (optional)	2	3	4	5	6	7	8	9	10	11
	Hydraulic installation set	1									
	Hydraulic connection set	–	1	2	3	4	5	6	7	8	9
	Vertical rack	2	3	4	5	6	7	8	9	10	11
	Vertical rail, aluminium	1	2	3	4	5	6	7	8	9	10

**Table 5.2: Components for flat roof installation**

### 5.1.7 Determining the ballast load (floating installation)



#### **Danger!**

#### **Risk of death and material damage due to excessive basic wind speeds!**

The racks are designed for basic wind speeds of up to 108 km/h. If the basic wind speed at the site is greater than 108 km/h, then there can be no guarantee claim for the system.

- Only install the rack in locations where the basic wind speed is a maximum of 108 km/h.

1. Please note the following for floating installation:

Installation variants	Please note
B	Weights that are firmly screwed onto the rack must consist of material capable of screw connections.
A and B	All weights must be weatherproof.

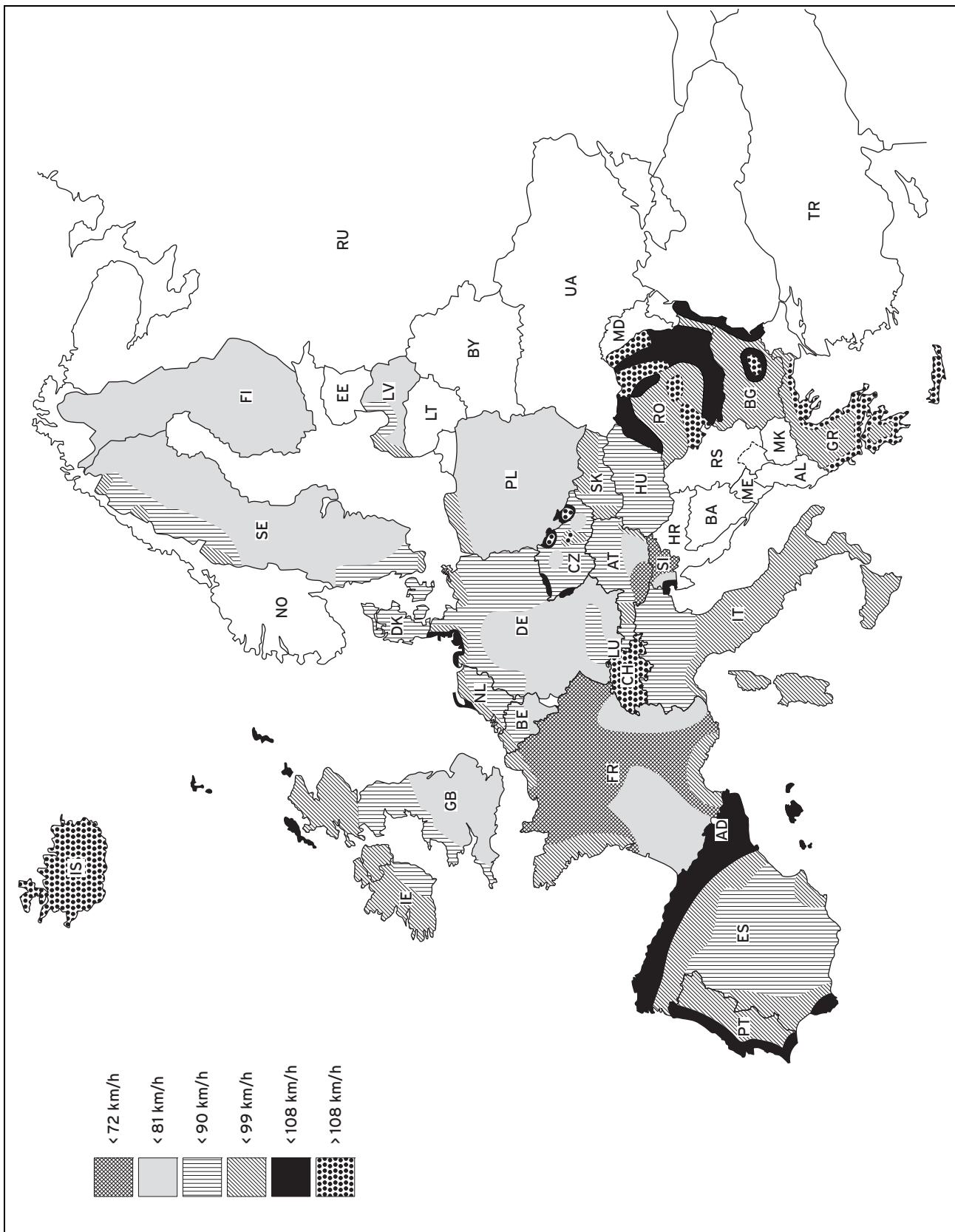
**Table 5.3: Properties of the weights**

- For detailed determination of the basic wind speed at the site and the required weights for the rack, use the Vaillant tool for dimensioning the wind and snow loads.
- For quick determination of the basic wind speed at the site, use the following map.
- For quick dimensioning of the required weights, use the following tables.



#### **Note**

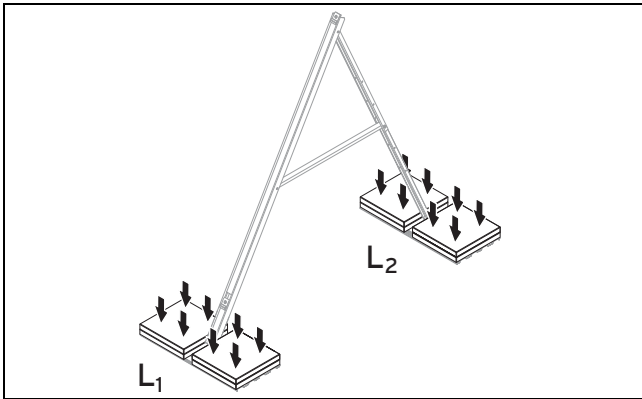
The map and tables are used for quick dimensioning of the ballast loads. Detailed dimensioning of the ballast loads is only possible using the Vaillant tool for dimensioning the wind and snow loads. If you have any questions on this subject, please contact your responsible Vaillant sales partner.



**Fig. 5.7: Basic wind speeds according to site**

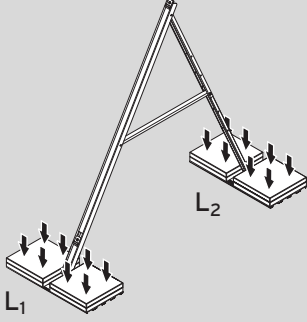
5. Use the map to determine the basic wind speed at the site.

## 5 Flat roof fitting and installation



**Fig. 5.8: Front (L<sub>1</sub>) and rear (L<sub>2</sub>) weights**

6. Use the tables to determine the required weights.

Horizontal collector position Installation angle 30°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
Basic wind speed [km/h]		Position	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	10-18 m	18-25 m
up to 72	Inland	L <sub>1</sub>	286	359	407	30	38	45
		L <sub>2</sub>	184	235	269	184	235	269
up to 72	Coast and islands	L <sub>1</sub>	392	461	505	43	53	59
		L <sub>2</sub>	259	307	345	259	307	338
up to 81	Inland	L <sub>1</sub>	339	445	515	35	50	61
		L <sub>2</sub>	221	296	345	221	296	345
up to 81	Coast and islands	L <sub>1</sub>	499	588	643	58	71	79
		L <sub>2</sub>	334	396	435	334	396	435
up to 90	Inland	L <sub>1</sub>	445	550	621	50	66	76
		L <sub>2</sub>	296	370	419	296	370	419
up to 90	Coast and islands	L <sub>1</sub>	586	691	762	71	86	96
		L <sub>2</sub>	395	469	518	395	469	518
up to 99	Inland	L <sub>1</sub>	550	656	762	66	81	96
		L <sub>2</sub>	370	444	518	370	444	518
up to 99	Coast and islands	L <sub>1</sub>	727	833	903	91	107	117
		L <sub>2</sub>	494	568	617	494	568	617
up to 108	Inland	L <sub>1</sub>	656	797	903	81	101	117
		L <sub>2</sub>	444	543	617	444	543	617
up to 108	Coast and islands	L <sub>1</sub>	868	974	1079	112	127	142
		L <sub>2</sub>	593	667	741	593	667	741

**Table 5.4: Weights for horizontal collector position, installation angle 30°**

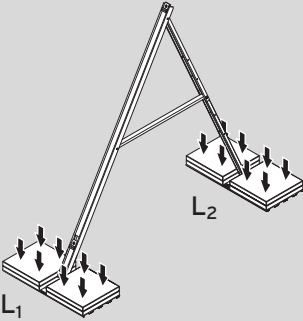
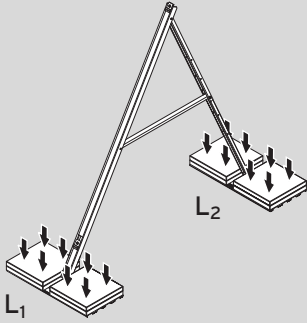
Horizontal collector position Installation angle 45°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
Basic wind speed [km/h]		Position	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	18-25 m	18-25 m
up to 72	Inland	L <sub>1</sub>	299	372	421	30	30	30
		L <sub>2</sub>	213	274	314	191	242	276
up to 72	Coast and islands	L <sub>1</sub>	406	476	521	30	30	30
		L <sub>2</sub>	301	359	396	265	315	346
up to 81	Inland	L <sub>1</sub>	352	495	531	30	30	30
		L <sub>2</sub>	257	345	404	228	303	352
up to 81	Coast and islands	L <sub>1</sub>	515	604	661	30	30	30
		L <sub>2</sub>	391	464	510	341	404	443
up to 90	Inland	L <sub>1</sub>	459	566	638	30	30	30
		L <sub>2</sub>	345	433	492	303	377	427
up to 90	Coast and islands	L <sub>1</sub>	602	709	781	30	30	30
		L <sub>2</sub>	462	550	609	402	477	526
up to 99	Inland	L <sub>1</sub>	566	673	781	30	30	30
		L <sub>2</sub>	433	521	609	377	452	526
up to 99	Coast and islands	L <sub>1</sub>	745	852	923	30	30	30
		L <sub>2</sub>	579	667	726	502	576	626
up to 108	Inland	L <sub>1</sub>	673	816	923	30	30	30
		L <sub>2</sub>	521	638	726	452	551	626
up to 108	Coast and islands	L <sub>1</sub>	888	995	1102	30	30	30
		L <sub>2</sub>	697	785	873	601	675	750

Table 5.5: Weights for horizontal collector position, installation angle 45°

## 5 Flat roof fitting and installation

Horizontal collector position Installation angle 60°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
Basic wind speed [km/h]		Position	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	10-18 m	18-25 m
up to 72	Inland	L <sub>1</sub>	268	334	378	30	37	45
		L <sub>2</sub>	297	377	430	196	247	281
up to 72	Coast and islands	L <sub>1</sub>	365	430	474	43	54	62
		L <sub>2</sub>	414	491	539	271	320	351
up to 81	Inland	L <sub>1</sub>	316	413	484	33	52	64
		L <sub>2</sub>	355	472	550	233	308	357
up to 81	Coast and islands	L <sub>1</sub>	468	557	613	61	76	85
		L <sub>2</sub>	532	630	691	346	408	448
up to 90	Inland	L <sub>1</sub>	413	519	590	52	70	82
		L <sub>2</sub>	472	589	667	308	382	432
up to 90	Coast and islands	L <sub>1</sub>	555	661	731	76	94	106
		L <sub>2</sub>	628	744	822	407	481	531
up to 99	Inland	L <sub>1</sub>	519	625	731	70	88	106
		L <sub>2</sub>	589	705	822	382	456	531
up to 99	Coast and islands	L <sub>1</sub>	696	802	873	100	118	130
		L <sub>2</sub>	783	900	978	506	580	630
up to 108	Inland	L <sub>1</sub>	625	767	873	88	112	130
		L <sub>2</sub>	705	861	978	456	556	630
up to 108	Coast and islands	L <sub>1</sub>	838	944	1050	124	142	160
		L <sub>2</sub>	939	1056	1172	605	680	754

**Table 5.6: Weights for horizontal collector position, installation angle 60°**

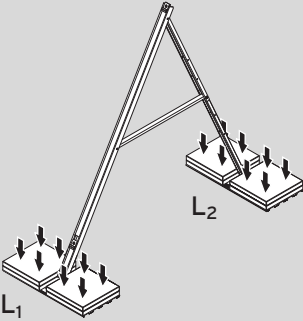
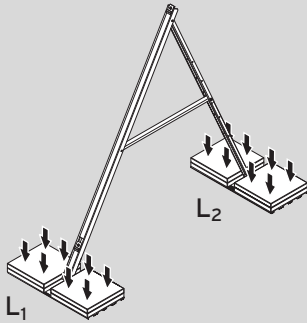
Vertical collector position Installation angle 30°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
Basic wind speed [km/h]		Position	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	10-18 m	18-25 m
up to 72	Inland	L <sub>1</sub>	301	378	429	44	40	70
		L <sub>2</sub>	167	213	244	167	213	244
up to 72	Coast and islands	L <sub>1</sub>	413	487	534	67	81	90
		L <sub>2</sub>	234	279	307	234	279	307
up to 81	Inland	L <sub>1</sub>	357	469	544	56	78	92
		L <sub>2</sub>	201	268	313	201	268	313
up to 81	Coast and islands	L <sub>1</sub>	527	621	680	89	108	119
		L <sub>2</sub>	303	359	395	303	359	395
up to 90	Inland	L <sub>1</sub>	469	581	656	78	100	115
		L <sub>2</sub>	268	335	380	268	335	380
up to 90	Coast and islands	L <sub>1</sub>	619	731	806	107	129	144
		L <sub>2</sub>	358	425	470	358	425	470
up to 99	Inland	L <sub>1</sub>	581	694	806	100	122	144
		L <sub>2</sub>	335	403	470	335	403	470
up to 99	Coast and islands	L <sub>1</sub>	768	881	955	137	159	174
		L <sub>2</sub>	448	515	560	448	515	560
up to 108	Inland	L <sub>1</sub>	694	843	955	122	152	174
		L <sub>2</sub>	403	492	560	403	492	560
up to 108	Coast and islands	L <sub>1</sub>	918	1030	1143	166	188	211
		L <sub>2</sub>	537	605	672	537	605	672

Table 5.7: Weights for vertical collector position, installation angle 30°

## 5 Flat roof fitting and installation

Vertical collector position Installation angle 45°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
Basic wind speed [km/h]		Position	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	10-18 m	18-25 m
up to 72	Inland	L <sub>1</sub>	321	401	454	30	30	30
		L <sub>2</sub>	191	245	281	173	220	251
up to 72	Coast and islands	L <sub>1</sub>	437	513	562	30	30	30
		L <sub>2</sub>	270	321	354	241	286	314
up to 81	Inland	L <sub>1</sub>	379	495	572	30	30	30
		L <sub>2</sub>	230	309	361	207	275	320
up to 81	Coast and islands	L <sub>1</sub>	555	652	713	30	30	30
		L <sub>2</sub>	350	415	4547	310	366	402
up to 90	Inland	L <sub>1</sub>	495	611	688	30	30	30
		L <sub>2</sub>	309	388	440	275	342	388
up to 90	Coast and islands	L <sub>1</sub>	650	766	843	30	30	30
		L <sub>2</sub>	414	493	545	365	433	478
up to 99	Inland	L <sub>1</sub>	611	727	843	30	30	30
		L <sub>2</sub>	388	466	545	342	410	478
up to 99	Coast and islands	L <sub>1</sub>	804	920	998	30	30	30
		L <sub>2</sub>	519	598	650	455	523	568
up to 108	Inland	L <sub>1</sub>	727	882	998	30	30	30
		L <sub>2</sub>	466	571	650	410	500	568
up to 108	Coast and islands	L <sub>1</sub>	959	1075	1191	30	30	34
		L <sub>2</sub>	624	703	781	546	613	681

**Table 5.8: Weights for vertical collector position, installation angle 45°**



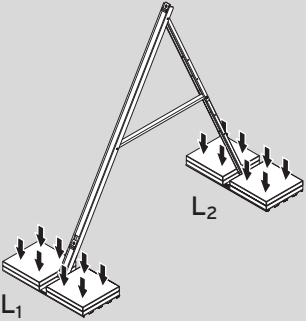
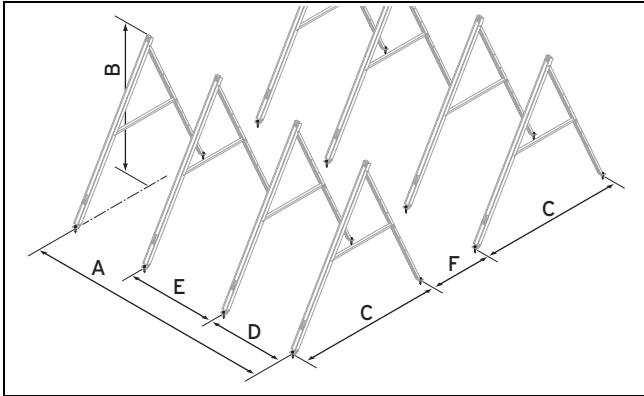
Vertical collector position Installation angle 60°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
Basic wind speed [km/h]		Position	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	10-18 m	18-25 m
up to 72	Inland	L <sub>1</sub>	297	372	421	30	30	37
		L <sub>2</sub>	267	339	387	179	225	256
up to 72	Coast and islands	L <sub>1</sub>	406	477	522	30	30	35
		L <sub>2</sub>	372	441	485	246	291	325
up to 81	Inland	L <sub>1</sub>	352	460	532	30	30	37
		L <sub>2</sub>	319	424	494	212	280	325
up to 81	Coast and islands	L <sub>1</sub>	516	607	664	35	45	52
		L <sub>2</sub>	479	566	621	315	372	407
up to 90	Inland	L <sub>1</sub>	460	568	641	30	41	49
		L <sub>2</sub>	424	529	599	280	348	393
up to 90	Coast and islands	L <sub>1</sub>	604	713	785	45	58	67
		L <sub>2</sub>	564	669	739	370	438	483
up to 99	Inland	L <sub>1</sub>	568	677	785	41	54	67
		L <sub>2</sub>	529	634	739	348	415	483
up to 99	Coast and islands	L <sub>1</sub>	749	857	930	62	75	84
		L <sub>2</sub>	704	809	879	461	528	573
up to 108	Inland	L <sub>1</sub>	677	821	930	54	71	84
		L <sub>2</sub>	634	774	879	415	506	573
up to 108	Coast and islands	L <sub>1</sub>	893	1002	1110	80	92	105
		L <sub>2</sub>	844	949	1054	551	619	686

Table 5.9: Weights for vertical collector position, installation angle 60°

## 5 Flat roof fitting and installation

### 5.1.8 Defining the rack clearances



**Fig. 5.9: Rack clearances**

► Define the rack clearances.

Number of collectors		A	30°		45°		60°		C	D	E
			B	F <sup>1)</sup>	B	F <sup>1)</sup>	B	F <sup>1)</sup>			
Vertical	1	970	1280	2927	1731	3666	2065	4019	2034	1100	1263
	2	2200									
	3	3463									
	4	4726									
	5	5989									
	6	7252									
	7	8515									
	8	9778									
	9	11041									
	10	12304									
Horizontal	1	1770	881	1897	1165	2276	1373	2446	1304	1900	2063
	2	3800									
	3	5863									
	4	7926									
	5	9989									
	6	12052									
	7	14115									
	8	16178									
	9	18241									
	10	20304									

<sup>1)</sup> Dimension applies to 20° position of the sun and must be checked according to the geographical location.

**Table 5.10: Rack clearances**

## 5.2 Carrying out the installation

### 5.2.1 Installing racks



#### **Danger!**

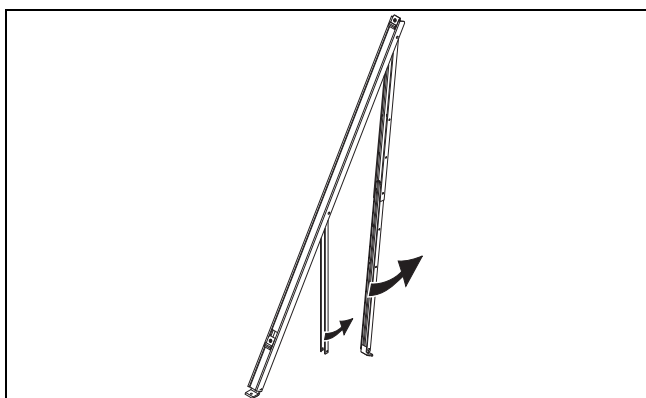
#### **Risk of death due to falling collectors!**

Unsecured collectors may fall from the flat roof due to the wind and present a danger to persons.

- ▶ Perform the following safety precautions according to the installation type.
- ▶ For direct connection, screw the rack properly onto the base.
- ▶ Only use suitable load weights.
- ▶ Observe the required ballast load of the load weights.

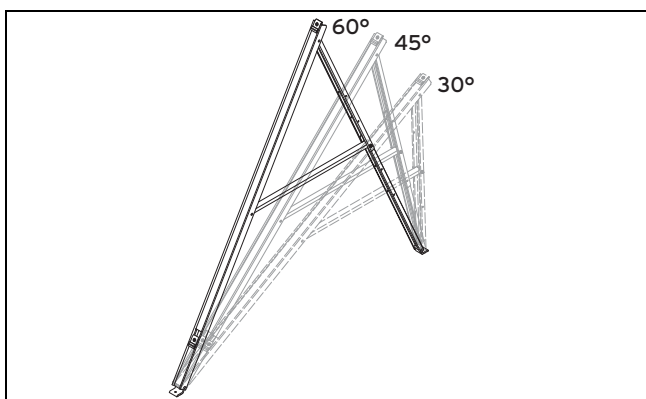
1. Determine the required number of racks.

Specifications/technical data	
For the first collector	Two racks
For each additional collector	One additional rack



**Fig. 5.10: Folding out the rack**

2. Fold out the first rack.

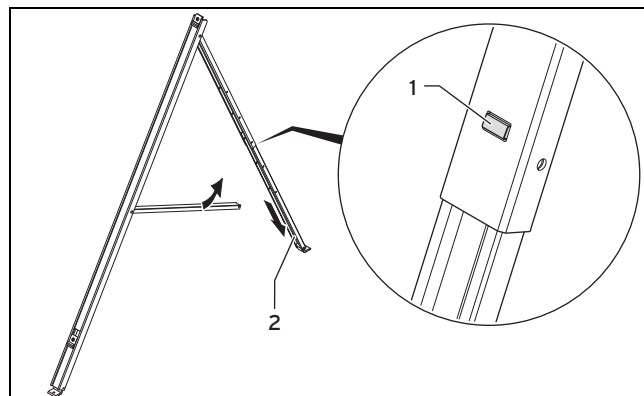


**Fig. 5.11: Selecting the installation angle**

3. Select the required installation angle.

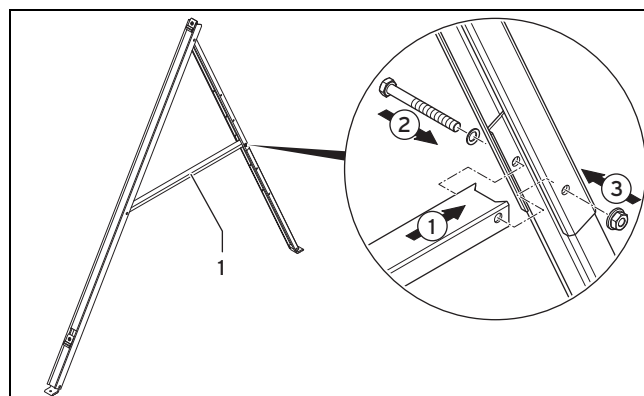
#### Specifications/technical data

Installation angle	<ul style="list-style-type: none"> <li>- 30°</li> <li>- 45°</li> <li>- 60°</li> </ul>
--------------------	---



**Fig. 5.12: Setting the installation angle**

4. Push the locking button (1) on the telescopic rail.
5. Pull the telescopic rail (2) into the desired installation angle and allow the locking button to engage again.

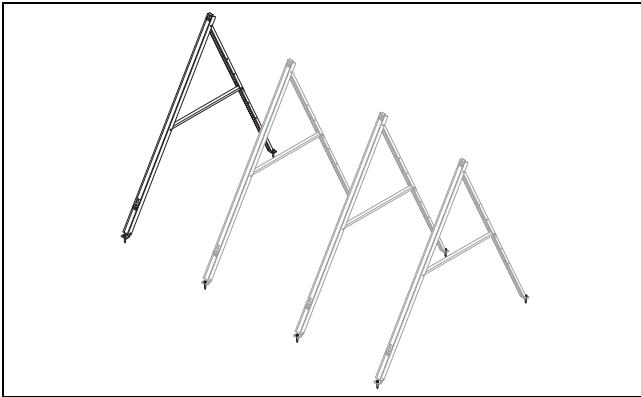


**Fig. 5.13: Fixing crossbeams in the telescopic rail**

6. Position the crossbeams (1) such that their fastening holes lie between the corresponding threaded holes in the telescopic rail.
7. To secure the rack, insert the fixing screw (2) through all rails.
8. Secure the fixing screw (2) with the self-locking nuts (3).
9. Tighten the nuts.

## 5 Flat roof fitting and installation

**Conditions:** Type of installation: Direct mounting



**Fig. 5.14: Rack for direct mounting**

### Screwing on the rack



#### Caution.

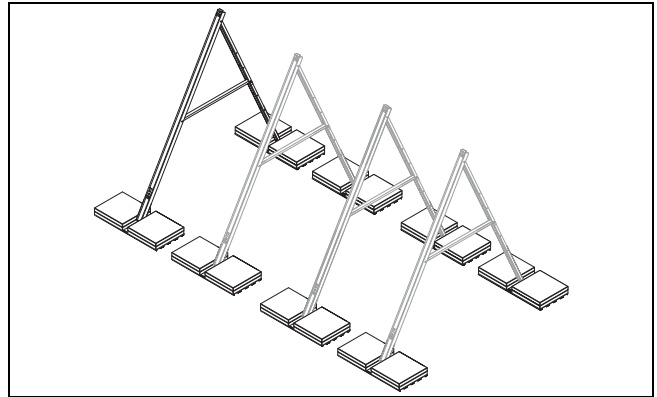
#### Lack of tightness due to destruction of the roof skin.

In the event of destruction of the roof skin, water can penetrate the building.

- ▶ Check the tightness of the roof skin after tightening screw connections.
- ▶ Restore the tightness of the roof skin if necessary.

- ▶ Define the required rack clearances as described in the chapter "Defining rack clearances".
- ▶ Drill the required holes at the defined positions.
- ▶ Secure the rack with fastenings appropriate to the base (diameter: at least 10 mm).
- ▶ Mount as many racks as you need to hold the collectors.

**Conditions:** Type of installation: Floating installation (with load plates)



**Fig. 5.15: Rack for installation with load plates**

### Preparing load plates



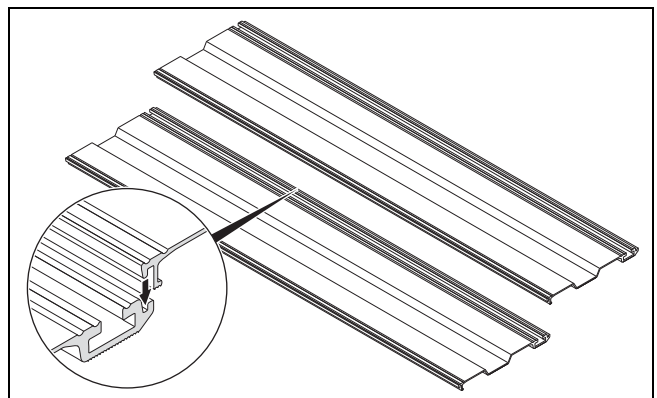
#### Caution.

#### Lack of tightness due to destruction of the roof skin.

In the event of destruction of the roof skin, water may penetrate the building.

- ▶ Ensure adequate protection of the roof skin during installation on roof sealing surfaces.
- ▶ Place large-area, non-slip building protection mats underneath the installation system.

- ▶ If the roof is covered with gravel, remove the gravel at the places where you wish to position the load plates, and use non-slip building protection mats to protect the roof skin.



**Fig. 5.16: Connecting two load plates**

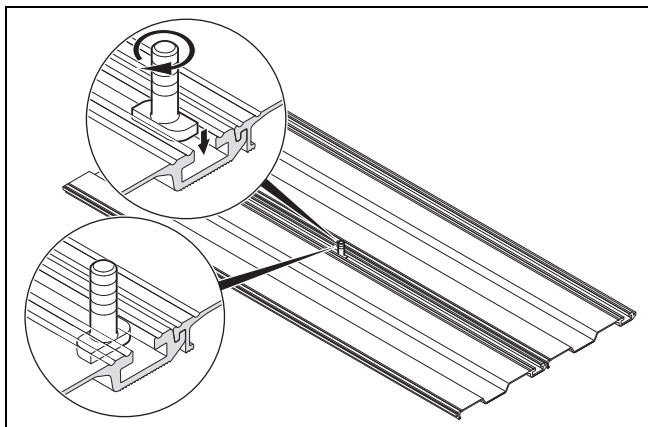
- ▶ Connect two load plates as shown in the illustration.
- ▶ Connect two additional load plates as shown in the illustration.



## Note

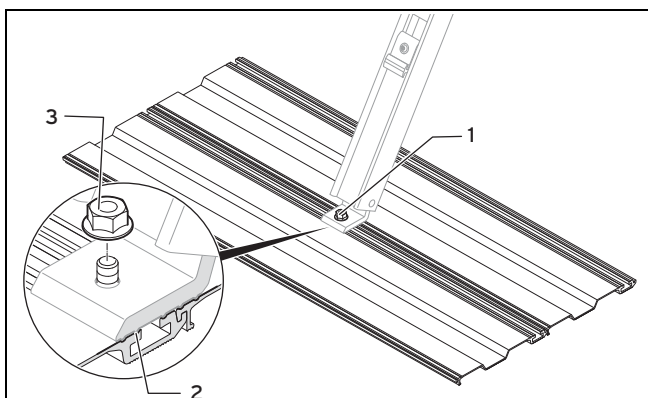
For each rack, you will need four load plates: one pair each for the front and rear rack feet.

- Align the load plates approximately in their final position on the flat roof.



**Fig. 5.17: Inserting and fixing hammer-head bolt**

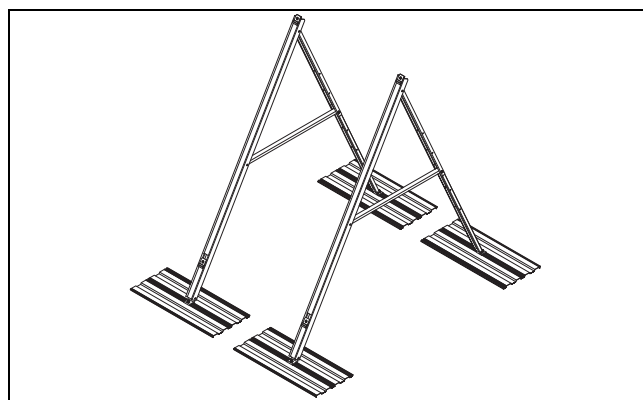
- Insert the first hammer-head bolt centrally in the groove between the first two load plates.
- To secure the hammer-head bolt, turn it by 90° in a clockwise direction.
- Secure the second hammer-head bolt in the same way between the other two load plates.



**Fig. 5.18: Screwing the rack onto load plates**

## Screwing the rack onto load plates and aligning

- Take hold of the first rack already secured in the installation angle.
  - Position the front rack feet above the hammer-head bolt (1).
  - When positioning the rack feet, ensure that the anti-rotation lock (2) engages.
  - Secure the rack feet with the self-locking nut (3).
  - Secure the rear rack feet in the same way on the other two load plates.
- ◄ The first rack is installed so that it is stable.



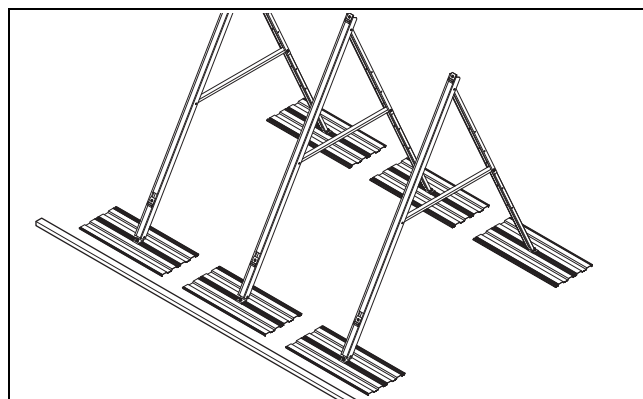
**Fig. 5.19: Rack installed on load plates**

- Install the second rack on the load plates as described above.
- Mount as many racks and load plates as you need to hold the collectors.



## Note

For one collector, you will need two racks. For each additional adjacent collector, you will need an additional rack.



**Fig. 5.20: Three racks aligned to hold two collectors**

- Align all racks with the load plates in their final position on the flat roof.
- The rack clearances can be found in the chapter "Defining rack clearances".

## 5 Flat roof fitting and installation

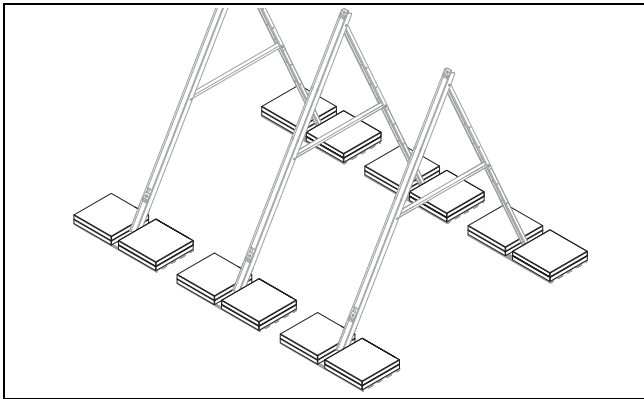


Fig. 5.21: Load weights on load plates

### Placing load weights on load plates

- ▶ Transport the required number of loading weights to the flat roof.
- ▶ Place the load weights on the load plates as shown above.
- ▶ Ensure that the distance between the loading weights and the racks is as small as possible.



#### **Danger!**

#### **Risk of death due to inadequate fastening of the load weights onto the load plates!**

If the load weights are inadequately secured on the load plates, collectors could fall from the roof and cause life-threatening accidents.

- ▶ Secure all load weights on the load plates adequately against slipping and tilting.

- ▶ Distribute the load weights evenly over the load plates.

**Conditions:** Type of installation: Floating installation (without load plates)

### Preparing weights



#### **Caution.**

#### **Lack of tightness due to destruction of the roof skin.**

In the event of destruction of the roof skin, water may penetrate the building.

- ▶ Ensure adequate protection of the roof skin during installation on roof sealing surfaces.
- ▶ Place large-area, non-slip building protection mats underneath the installation system.

- ▶ If the roof is covered with gravel, remove the gravel at the places where you wish to position the weights, and use non-slip building protection mats to protect the roof skin.

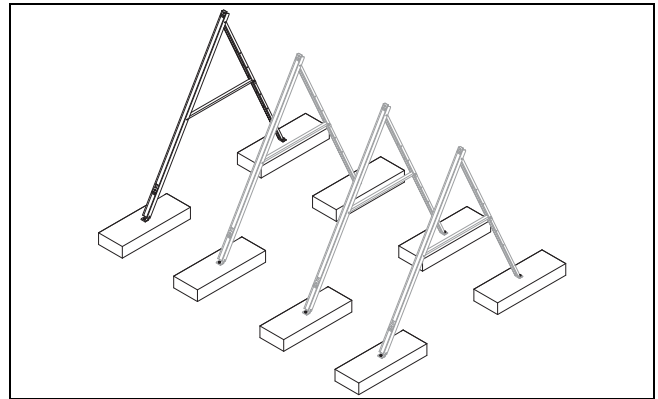


Fig. 5.22: Rack for installation on weights

- ▶ Define the required rack clearances as described in the chapter "Defining rack clearances".



#### **Note**

For each rack, you need two equal weights. For the first collector, you therefore need four weights. For each additional collector, you will need an additional rack.

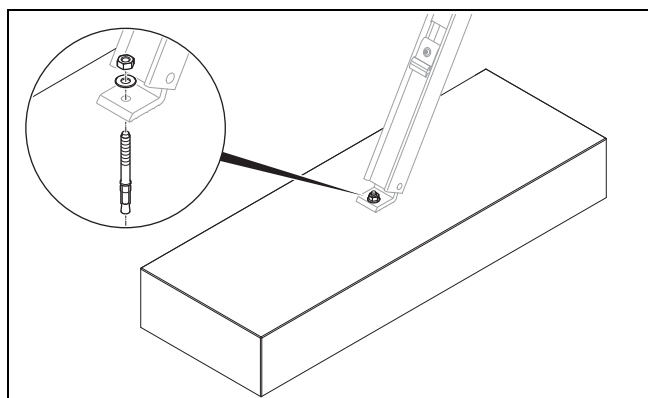
- ▶ Transport the required number of weights to the flat roof.
- ▶ Lay the weights in the final positions of the installation site.



#### **Note**

The four weights for holding two racks for a collector are very heavy. Therefore, it is advisable to determine the final position and orientation of the weights before screwing on the rack and laying the weights there.

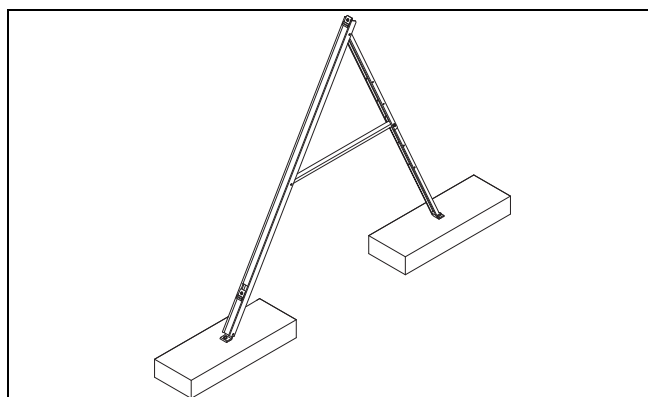
- ▶ Select a suitable fastening material for the weights used (diameter: at least 10 mm).
- ▶ Drill a hole into the centre of each weight.



**Fig. 5.23: Screwing the rack onto a weight**

## Screwing the rack onto weights

- ▶ Take hold of the first rack that is already secured in the installation angle.
- ▶ Screw the front rack feet onto the first weight.
- ▶ Screw the rear rack feet onto the second weight.
- ◁ The first rack is installed so that it is stable.



**Fig. 5.24: Rack installed on weights**

- ▶ Install the second rack on the next two weights as described above.
- ▶ Fit as many racks as you need to hold the collectors.

## 5.2.2 Installing collectors



✦ 5 mm Allen key



### Danger!

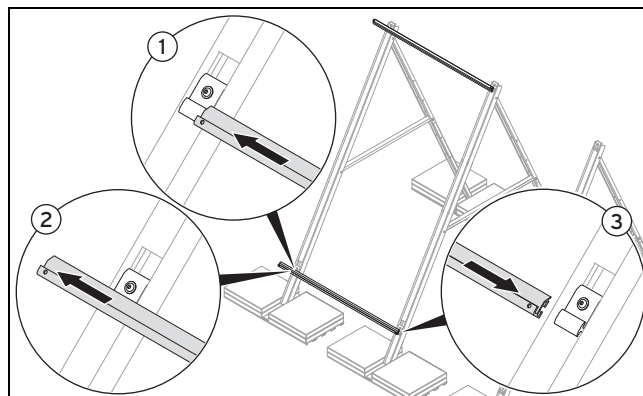
**Personal injury and material damage due to a falling collector.**

Improper fastening may cause a collector to fall.

- ▶ Tighten the clamping elements.
- ▶ Check for proper tensioning by shaking the clamping blocks.
- ▶ If a clamping block is mobile, tighten the nut again.

1. Install the collectors on the roof as specified in the following sections.

### Sliding on mounting rails

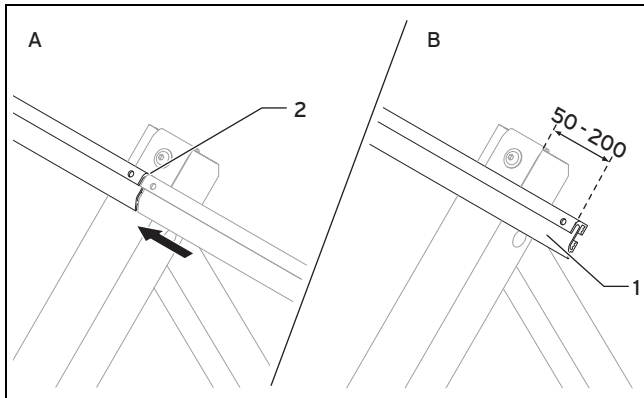


**Fig. 5.25: Sliding on mounting rails**

2. Slide the two mounting rails (top and bottom) onto the brackets, as shown in the image.
3. Ensure that the open side of the bottom mounting rail is facing upwards and that the open side of the top mounting rail is facing downwards.
4. First slide the mounting rail onto one bracket **(1)**.
5. Slide the mounting rail a little outwards **(2)**.
6. Then slide the mounting rail back to the other bracket **(3)**.
7. Perform these steps one after the other for all racks.

## 5 Flat roof fitting and installation

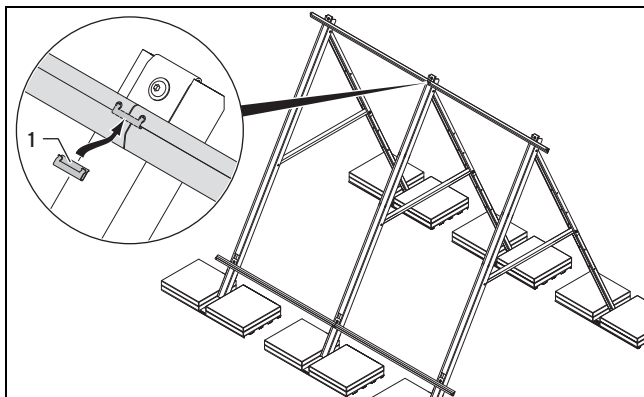
### Fitting mounting rails to several racks



**Fig. 5.26: Fitting mounting rails to several racks**

8. When installing several collectors next to each other, allow the mounting rails to end in the centre of the brackets **(A)**.
9. Allow the mounting rails on the first and last rack to protrude 50-200 mm over the edge **(B)**.

### Connecting mounting rails



**Fig. 5.27: Connecting mounting rails**

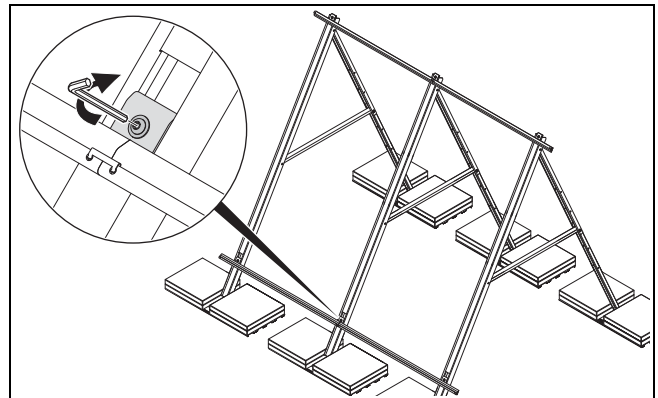
10. Clamp the rail connector **(1)** into the mounting rails.
11. Ensure that the rail connector **(1)** engages in the holes of the mounting rails.



#### Note

After installation, the rail connectors are no longer accessible.

### Securing the mounting rails at the bottom



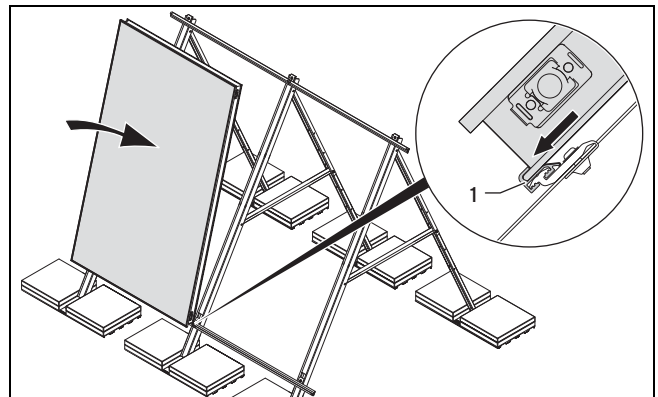
**Fig. 5.28: Securing the mounting rails at the bottom**

12. Screw the brackets tightly onto the lower mounting rails.

#### Working materials

5 mm Allen key

### Hooking the collector in at the bottom



**Fig. 5.29: Hooking the collector in at the bottom**



#### Danger!

#### Risk of burns and scalding!

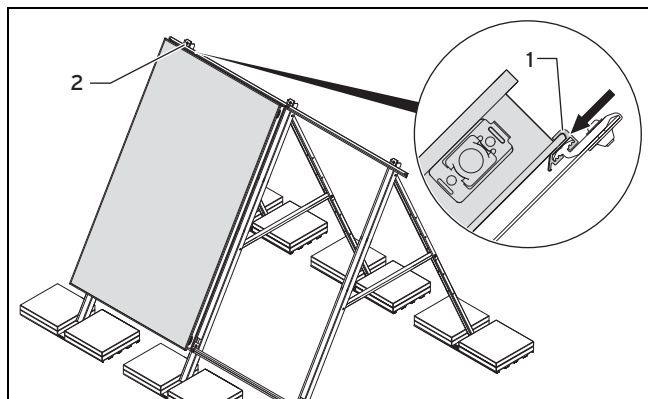
In the event of solar radiation inside the units, collectors can reach 200 °C.

- ▶ Avoid working in direct sunlight.
- ▶ Cover the collectors before starting work.
- ▶ You should preferably perform the work in the morning.
- ▶ Wear suitable safety gloves.

13. Lay the collector with the lower edge in the profile of the mounting rail **(1)**. Ensure that the mounting rail **(1)** surrounds the lower edge of the collector.



## Securing the collector at the top



**Fig. 5.30: Securing the collector at the top**

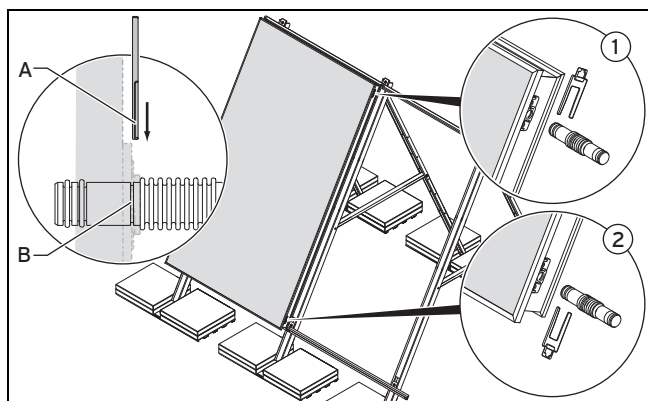
14. Slide the left side of the top mounting rail **(1)** until it is flush with the collector.
15. Ensure that the mounting rail **(1)** surrounds the top edge of the collector.
16. Screw the bracket securely on the top left **(2)**.

### Working materials

5 mm Allen key

17. Ensure that the mounting rail does not slip while you are tightening the screw.

## Installing hydraulic connectors



**Fig. 5.31: Installing hydraulic connectors**



### Caution.

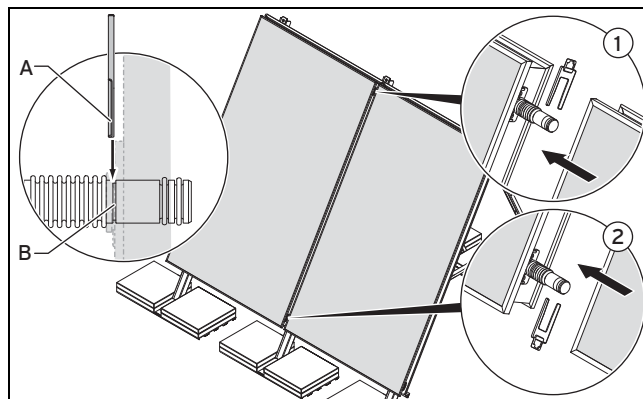
#### Risk of damage to the collector.

Improper installation of the pipe connectors may damage the collector.

- Ensure that the clamps **(A)** slide into the grooves of the pipe connector **(B)**.

18. Remove the delivery plugs from the mounting openings.
19. Insert the top **(1)** and bottom **(2)** pipe connectors into the mounting openings until the stop.
20. Slide the clamps into the rails of the mounting openings **(2)**.

## Installing additional collectors



**Fig. 5.32: Installing additional collectors**

21. Position the next collector on the lower mounting rail.
22. Slide the collector to the first collector.



### Caution.

#### Risk of damage to the collector.

Improper installation of the pipe connectors may damage the collector.

- Ensure that the clamps **(A)** slide into the grooves of the pipe connector **(B)**.

23. Secure the top and bottom hydraulic connectors with the clamps **(1)** and **(2)**.
24. Slide the second top mounting rail until it is flush with the collector.
25. Screw the second top mounting rail tightly onto the mounting rail of the first collector using the corresponding bracket.

### Working materials

5 mm Allen key

## Completing collector rows

**Conditions:** Not all collectors in a row have been installed yet.

- Install the hydraulic connectors. (→ Page 53)
- Install an additional collector. (→ Page 53)

## 5 Flat roof fitting and installation

### 5.2.3 Installing hydraulic connections



#### Caution.

#### Lack of tightness due to incorrect accessories.

Incorrect accessories may result in lack of tightness of the solar circuit and cause material damage.

- Only work in the solar circuit with hard soldered connections, flat seals, compression fittings or press fittings which have been approved by the manufacturer for use in solar circuits and at correspondingly high temperatures.

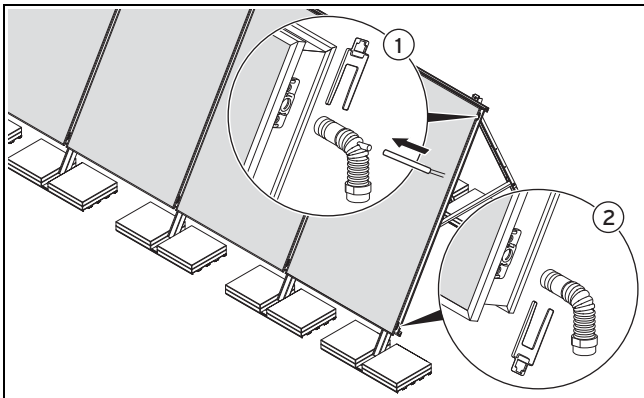
1. Install the hydraulic connections on the collectors, as specified in the following sections.



#### Note

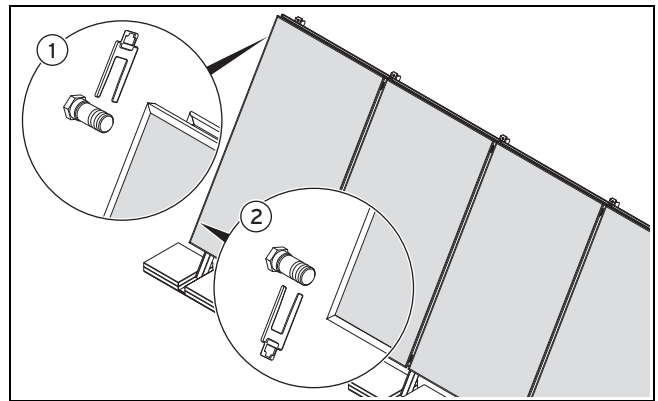
If you connect six or more collectors one behind the other, you must arrange the hydraulic connections diagonally in order to force complete flow. (→ Page 14)

**Conditions:** Number of collectors: 1 ... 5



**Fig. 5.33: Installing the flow/return and collector sensor**

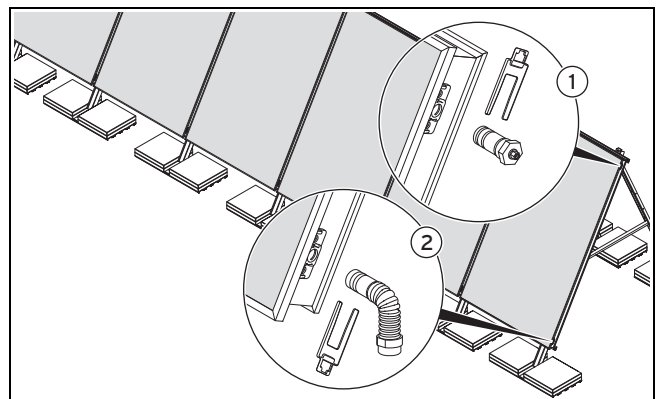
- Connect the flow (outlet with opening for collector sensor) at the top **(1)**.
- Secure the flow with the clamp **(1)**.
- Remove the red plug from the opening for the collector sensor.
- Insert the **VR 11** collector sensor into the opening **(1)**.
- Use a cable tie to secure the **VR 11** collector sensor against slipping out.
- Connect the return (inlet) at the bottom **(2)**.
- Secure the return with the clamp **(2)**.



**Fig. 5.34: Installing plugs with vent openings**

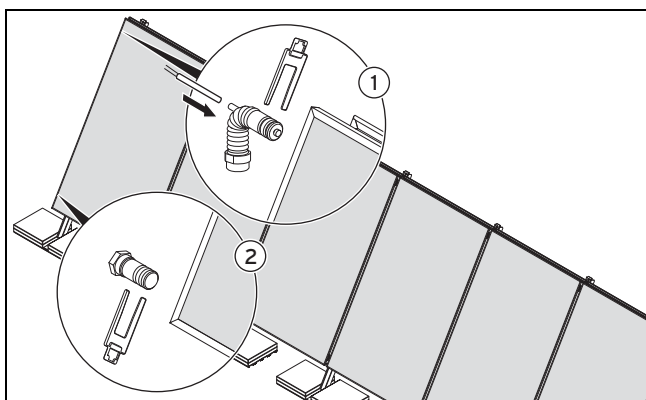
- Install the two plugs with vent openings on the other side of the collector field at the top and bottom of the collector **((1) and (2))**.
- Secure the two plugs with the clamps **((1) and (2))**.
- Connect the collector flow and return to the system with the connection pipes.
- Check the connections for tightness.

**Conditions:** Number of collectors:  $\geq 6$



**Fig. 5.35: Installing the return and the first plug**

- Insert the return (inlet) on one side into the lower lateral opening **(2)**.
- Secure the return with the clamp **(2)**.
- Install the first plug with vent opening at the top lateral opening **(1)**.
- Secure the first plug with the clamp **(1)**.



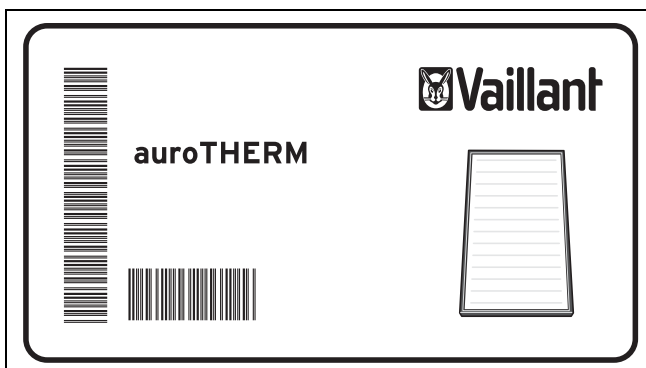
**Fig. 5.36: Installing the flow, second plug and collector sensor**

- ▶ Insert the flow (outlet with opening for collector sensor) diagonally opposite into the top lateral opening **(1)**.
- ▶ Secure the flow with the clamp **(1)**.
- ▶ Remove the red plug from the opening for the collector sensor.
- ▶ Insert the **VR 11** collector sensor into the opening **(1)**.
- ▶ Use a cable tie to secure the **VR 11** collector sensor against slipping out.
- ▶ Install the second plug with vent opening at the lower lateral opening **(2)**.
- ▶ Secure the second plug with the clamp **(2)**.
- ▶ Connect the collector flow and return to the system with the connection pipes.
- ▶ Check the connections for tightness.

## 5.3 Completing and checking the installation

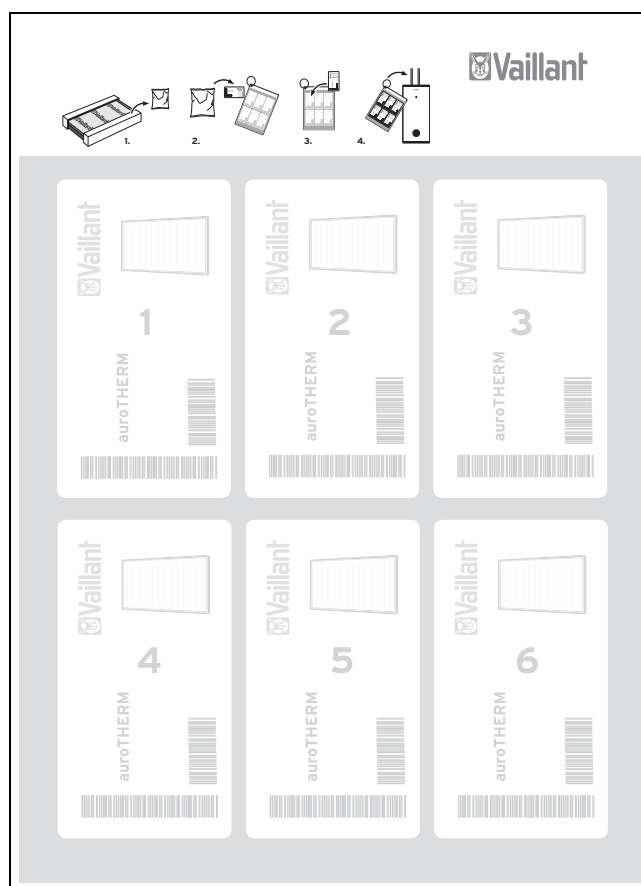
### 5.3.1 Using the customer service card

1. Remove the packaging with the serial number sticker from the transport packaging of the collector.
2. Remove the serial number sticker from the packaging.



**Fig. 5.37: Serial number sticker for customer service card**

3. Remove the customer service card from the hydraulic installation set.



**Fig. 5.38: Customer service card**

4. Stick the sticker onto the first field in the customer service card.
5. Secure the customer service card in an easily visible place near the solar system cylinder.

## 5 Flat roof fitting and installation

### 5.3.2 Checking installation

Use the following checklist to ensure that all work steps have been performed.

**Note**

After initial start-up, and in seasons with significant ambient temperature fluctuations, condensate may form in the collector. This is normal.

**Note**

Reflections caused by irregularities of the glass are typical of the material.

Operations	Yes	No	Comments
Building statics taken into account during installation of the system	<input type="checkbox"/>	<input type="checkbox"/>	
Clearances from the roof edge complied with in accordance with the specifications	<input type="checkbox"/>	<input type="checkbox"/>	
Rack positioned in accordance with the dimensions specifications	<input type="checkbox"/>	<input type="checkbox"/>	
All bolts securely tightened (Installation and telescopic rail)	<input type="checkbox"/>	<input type="checkbox"/>	
Adequate ballast weights used (Only for floating installation)	<input type="checkbox"/>	<input type="checkbox"/>	
Load weights adequately secured against slipping and tilting (Only for floating installation)	<input type="checkbox"/>	<input type="checkbox"/>	
Rack anchored and bolts tightened (Only for direct connection)	<input type="checkbox"/>	<input type="checkbox"/>	
All hydraulic connections secured with clamps	<input type="checkbox"/>	<input type="checkbox"/>	
Hydraulic connections routed correctly	<input type="checkbox"/>	<input type="checkbox"/>	
<b>VR 11</b> collector sensor connected	<input type="checkbox"/>	<input type="checkbox"/>	
Collectors connected to lightning protection device (Optionally for lightning protection device)	<input type="checkbox"/>	<input type="checkbox"/>	
Pressure testing performed (Ideally with compressed air)	<input type="checkbox"/>	<input type="checkbox"/>	
All connections tight	<input type="checkbox"/>	<input type="checkbox"/>	

**Date**

**Signature**

All installation work has been performed correctly.

---'---'----

### 5.3.3 Disposing of the packaging

The transport packaging consists largely of recyclable materials.

- Observe the applicable regulations.
- Dispose of the transport packaging properly.

## 6 Inspection and maintenance

### 6 Inspection and maintenance

#### 6.1 Maintenance plan

The following table shows the inspection and maintenance work that must be carried out at specific intervals.

##### 6.1.1 Calendar-based maintenance intervals

###### Calendar-based maintenance intervals

Interval	Maintenance work	Page
Annually	Checking collectors and connections for damage, dirt and lack of tightness	59
	Cleaning collectors	59
	Checking brackets and collector components for firm seating	59
	Check the pipe insulations for damage	59
	Replacing damaged pipe insulations	59
	Disposing of damaged pipe insulations	59

#### 6.2 Observing inspection and maintenance intervals

Regular inspection/maintenance of the entire solar plant by a competent person is a prerequisite for ensuring that the system is constantly ready for operation, reliable and has a long service life. Vaillant recommends that you sign a maintenance contract.



##### **Danger!**

**Risk of death, injury and material damage due to failure to perform maintenance and repairs work!**

Failure to perform maintenance or repair work, or failure to comply with the specified maintenance intervals, may impair the operating safety of the unit and cause material damage and personal injury.

- Instruct the operator to observe the specified maintenance intervals strictly.
- Perform maintenance work on the collectors in accordance with the maintenance plan.

#### 6.3 General inspection and maintenance instructions



##### **Danger!**

**Risk of death, injury and material damage due to improper maintenance and repairs!**

Improper maintenance work or repairs can impair the operating safety of the unit and result in material damage and personal injury.

- Only perform maintenance work and repairs on the collectors if you are a qualified competent person.

#### 6.4 Preparing for inspection and maintenance

##### 6.4.1 Spare parts for maintenance

###### Procuring spare parts

If you require spare parts for servicing or repair work, use only Vaillant genuine spare parts.

The original components of the unit were also certified as part of the CE declaration of conformity. If you do not use certified Vaillant genuine spare parts, this voids the CE conformity of the unit. We therefore strongly recommend that you fit Vaillant genuine spare parts.

###### Replacement parts

**Applies to:** Great Britain

An overview of the available genuine Vaillant spare parts can be obtained:

- From your parts wholesaler
- Alternatively contact Spares Technical Enquiries on 01773 596615 or via email: [technicalspares@groupservice.co.uk](mailto:technicalspares@groupservice.co.uk)

##### 6.4.2 Preparing for maintenance

- Put together all the tools and materials required for the maintenance work.

## 6.5 Checking collectors and connections for damage, dirt and lack of tightness

1. Check the collectors for damage.  
If the collectors are damaged:
  - ▶ Replace the collectors.
2. Check the collectors for dirt.  
If the collectors are dirty:
  - ▶ Clean the collectors. (→ Page 59)
3. Check the connections for lack of tightness.  
If the connections are not tight:
  - ▶ Seal the leaking connections. (→ Page 60)

## 6.6 Cleaning collectors



### **Danger!**

#### **Risk of burns and scalding!**

In the event of solar radiation inside the units, collectors can reach 200 °C.

- ▶ Avoid working in direct sunlight.
- ▶ You should preferably perform the work in the morning.
- ▶ Wear suitable safety gloves.
- ▶ Wear suitable protective goggles.



### **Caution.**

#### **Material damage due to high-pressure cleaner.**

High-pressure cleaners may damage the collectors due to the extremely high pressure.

- ▶ Never clean the collectors with a high-pressure cleaner.



### **Caution.**

#### **Material damage due to cleaning agent.**

Cleaning agents may damage the surface structure of the collector and decrease its efficiency.

- ▶ Never clean the collector with cleaning agents.

- ▶ Clean the collectors with a sponge and water.

## 6.7 Checking brackets and collector components for firm seating

- ▶ Check the firm seating of all threaded connections.  
If threaded connections are loose:
  - ▶ Tighten the threaded connections.

## 6.8 Check the pipe insulations for damage

- ▶ Check the pipe insulations for damage.  
If the pipe insulations are damaged:
  - ▶ To avoid heat losses, replace any damaged pipe insulations. (→ Page 59)

## 6.9 Replacing damaged pipe insulations

1. Put the solar plant temporarily out of operation (→ Page 61).
2. Replace the damaged pipe insulations.
3. Start the solar plant up again.

## 6.10 Disposing of damaged pipe insulations

The pipe insulations consist largely of recyclable materials.

The pipe insulations must not be disposed of with normal household waste.

- ▶ Observe the applicable regulations.
- ▶ Dispose of the damaged pipe insulations properly.

### 7 Troubleshooting

#### 7.1 Spare parts for repair

##### Procuring spare parts

If you require spare parts for servicing or repair work, use only Vaillant genuine spare parts.

The original components of the unit were also certified as part of the CE declaration of conformity. If you do not use certified Vaillant genuine spare parts, this voids the CE conformity of the unit. We therefore strongly recommend that you fit Vaillant genuine spare parts.

##### Replacement parts

**Applies to:** Great Britain

An overview of the available genuine Vaillant spare parts can be obtained:

- From your parts wholesaler
- Alternatively contact Spares Technical  
Enquiries on 01773 596615 or via email: [technicalspares@groupservice.co.uk](mailto:technicalspares@groupservice.co.uk)

#### 7.2 Carrying out repairs

##### 7.2.1 Replace leaking collectors



##### **Danger!** **Risk of burns and scalding!**

In the event of solar radiation inside the units, collectors can reach 200 °C.

- ▶ Avoid working in direct sunlight.
- ▶ Cover the collectors before starting work.
- ▶ You should preferably perform the work in the morning.
- ▶ Wear suitable safety gloves.

1. Put the solar plant temporarily out of operation (→ Page 61).
2. Replace the leaking collectors.
3. Start up the solar plant again as described in the operating system instructions.

##### 7.2.2 Disposing of defective collectors

Your Vaillant collector consists largely of recyclable materials.

The Vaillant collector must not be disposed of with normal household waste.

- ▶ Observe the applicable regulations.
- ▶ Dispose of defective Vaillant collectors properly.

##### 7.2.3 Sealing leaking connections



##### **Danger!** **Risk of burns and scalding!**

In the event of solar radiation inside the units, collectors can reach 200 °C.

- ▶ Avoid working in direct sunlight.
- ▶ Cover the collectors before starting work.
- ▶ You should preferably perform the work in the morning.
- ▶ Wear suitable safety gloves.

1. Put the solar plant temporarily out of operation (→ Page 61).
2. Seal the leaking connections.
3. Start up the solar plant again as described in the operating system instructions.

##### 7.2.4 Replacing defective pipe insulations

1. Put the solar plant temporarily out of operation (→ Page 61).
2. To avoid heat losses, replace any defective pipe insulations.
3. Start up the solar plant again as described in the operating system instructions.

##### 7.2.5 Disposing of defective pipe insulations

The pipe insulations consist largely of recyclable materials.

The pipe insulations must not be disposed of with normal household waste.

- ▶ Observe the applicable regulations.
- ▶ Dispose of the defective pipe insulations properly.



## 8 Decommissioning

### 8.1 Temporary decommissioning



**Caution.**  
**Damage to the collectors.**

Collectors that are not in operation may age more rapidly due to long periods of high idle temperatures.

- ▶ Only put the solar plant out of operation if you are a competent person.
- ▶ Do not decommission the collectors for more than four weeks.
- ▶ Cover any collectors that are not in use. Make sure that the cover is securely fastened.
- ▶ In the event of long periods of decommissioning of the solar plant, dismantle the collectors.



**Caution.**  
**Oxidation of the solar fluid.**

If the solar circuit is opened when out of service for a prolonged period of time, the solar fluid may age more rapidly due to the penetrating oxygen in the air.

- ▶ Only decommission the solar plant if you are a competent person.
- ▶ Do not decommission the collectors for more than four weeks.
- ▶ Before decommissioning the system for a prolonged period of time, drain the entire solar plant and dispose of the solar fluid properly.
- ▶ In the event of long periods of decommissioning of the solar plant, dismantle the collectors.

For repair or maintenance work, you can temporarily decommission the solar plant. To do this, you must switch off the solar pump.

- ▶ Temporarily decommission the solar plant, as described in the operating system instructions.

### 8.2 Permanently decommissioning

#### 8.2.1 Removing collectors



**Danger!**  
**Risk of burns and scalding!**

In the event of solar radiation inside the units, collectors can reach 200 °C.

- ▶ Avoid working in direct sunlight.
- ▶ Cover the collectors before starting work.
- ▶ You should preferably perform the work in the morning.
- ▶ Wear suitable safety gloves.



**Caution.**  
**Damage to the collector and the solar plant.**

Improper removal may cause damage to the collector and to the solar plant.

- ▶ Before removing the collectors, ensure that a competent person or a Vaillant customer service engineer decommissions the solar plant.



**Caution.**  
**Environmental hazard due to solar fluid.**

After the solar plant is decommissioned, the collector is still filled with solar fluid which can leak out during removal.

- ▶ During transport from the roof, seal the pipe connections of the collector with the red plugs.

1. Undo the hydraulic connections.
2. Undo the brackets.
3. Remove the collectors from the roof.
4. Remove the hydraulic connections.
5. Drain the collector fully into a canister through two connections.
6. Close the collector connections.
7. Use adequate packing around the collectors.
8. Dispose of the collectors and the solar fluid.

#### 8.2.2 Recycling and disposal

Your Vaillant collector consists largely of recyclable materials.

- ▶ Observe the applicable regulations.

## 8 Decommissioning

### **Disposing of collectors**

You must not dispose of your Vaillant collector or any of its accessories in normal domestic waste.

- Dispose of the old unit and any accessories properly.

### **Disposing of solar fluid**

The solar fluid must not be disposed of with normal household waste.

- Dispose of the solar fluid in compliance with local regulations through an appropriate disposal company.
- Dispose of packaging that cannot be cleaned in the same way as solar fluid.

Uncontaminated packaging can be reused.

## 9 Customer service

### Vaillant Service

**Applies to:** Great Britain

To ensure regular servicing, it is strongly recommended that arrangements are made for a Maintenance Agreement.

Please contact Vaillant Service Solutions for further details:  
+44 80 70 606 07 77

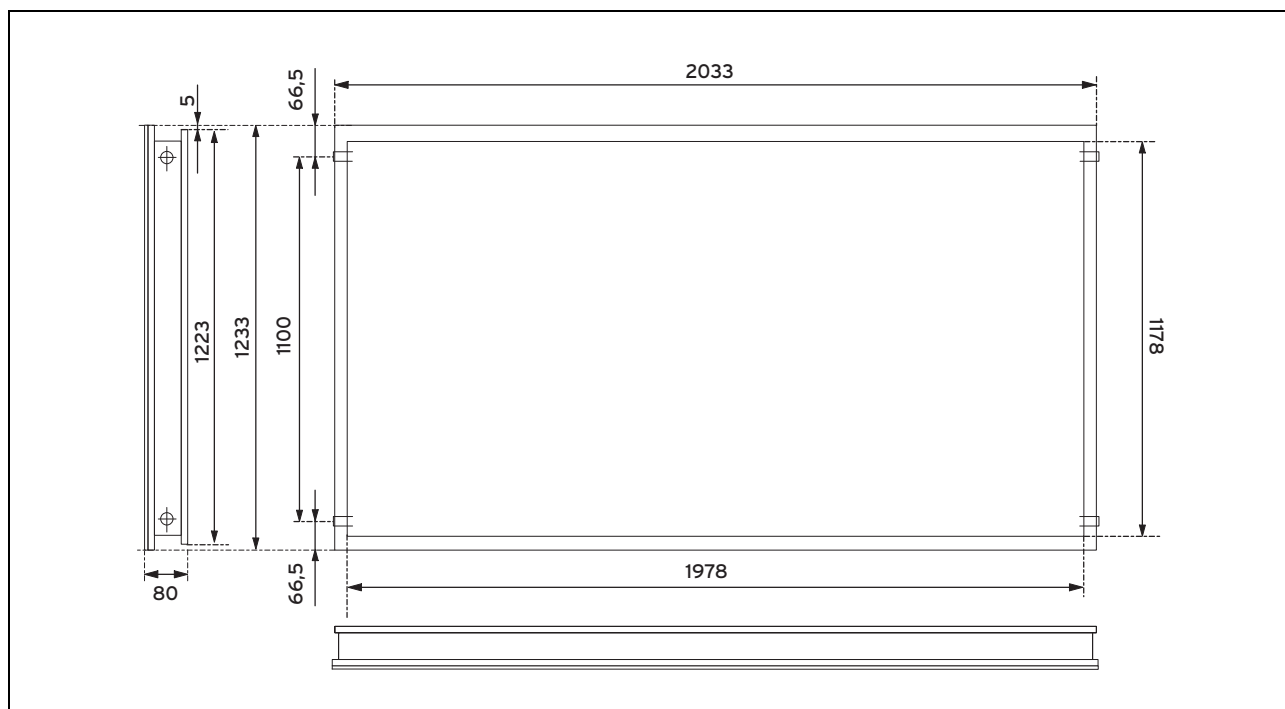
## 10 Technical data

### 10.1 Technical data table

	Unit	VFK 145 H/V	VFK 150 H/V	VFK 155 H/V
Absorber type	–	Serpentine horiz./vert.		
Dimensions of vertical collectors (L x W x H)	mm	2033 x 1233 x 80		
Dimensions of horizontal collectors (L x W x H)	mm	1233 x 2033 x 80		
Weight	kg	38		
Liquid volume	l	2.16 (H) 1.85 (V)		
Max. permissible operating pressure	bar	10		
Shutdown temperature	°C	171	172	175
Gross area	m²	2.51		
Aperture surface area	m²	2.35		
Absorber surface area	m²	2.33		
Absorber	mm	Aluminium (vacuum-coated) 0.5 x 1178 x 1978		
Coating	–	High selective (blue)		
		$\alpha$ = 95% $\epsilon$ = 5%		
Glass covering	mm	3.2		
Glass type	–	Solar safety glass (prismatic structure)	Solar safety glass (anti-reflective coating)	
Transmission	%	$\tau$ = 91	$\tau$ = 96	
Back wall insulation	mm W/m²K	40 $\lambda$ = 0.035		
Edge insulation	–	None		Available
Efficiency $\eta_0$	%	80.1 (H) 79.1 (V)	84.2 (H) 83.3 (V)	82.7 (H) 83.2 (V)
Heat capacity	Ws/m²K	9700 (H) 8200 (V)		7070
Heat loss factor ( $k_1$ )	W/m²K	3.32 (H) 2.41 (V)	3.82 (H) 2.33 (V)	3.288 (H) 3.297 (V)
Heat loss factor ( $k_2$ )	W/m²K²	0.023 (H) 0.049 (V)	0.018 (H) 0.049 (V)	0.018 (H) 0.017 (V)
Max. wind load	kN/m²	1.6		
Max. standard snow load	kN/m²	5.0		
On-roof installation angle	°	15 - 75		
Flat roof installation angle	°	30, 45, 60		

**Table 10.1: Technical data table**

## 10.2 Dimensions



**Fig. 10.1: Dimensions of horizontal collectors**

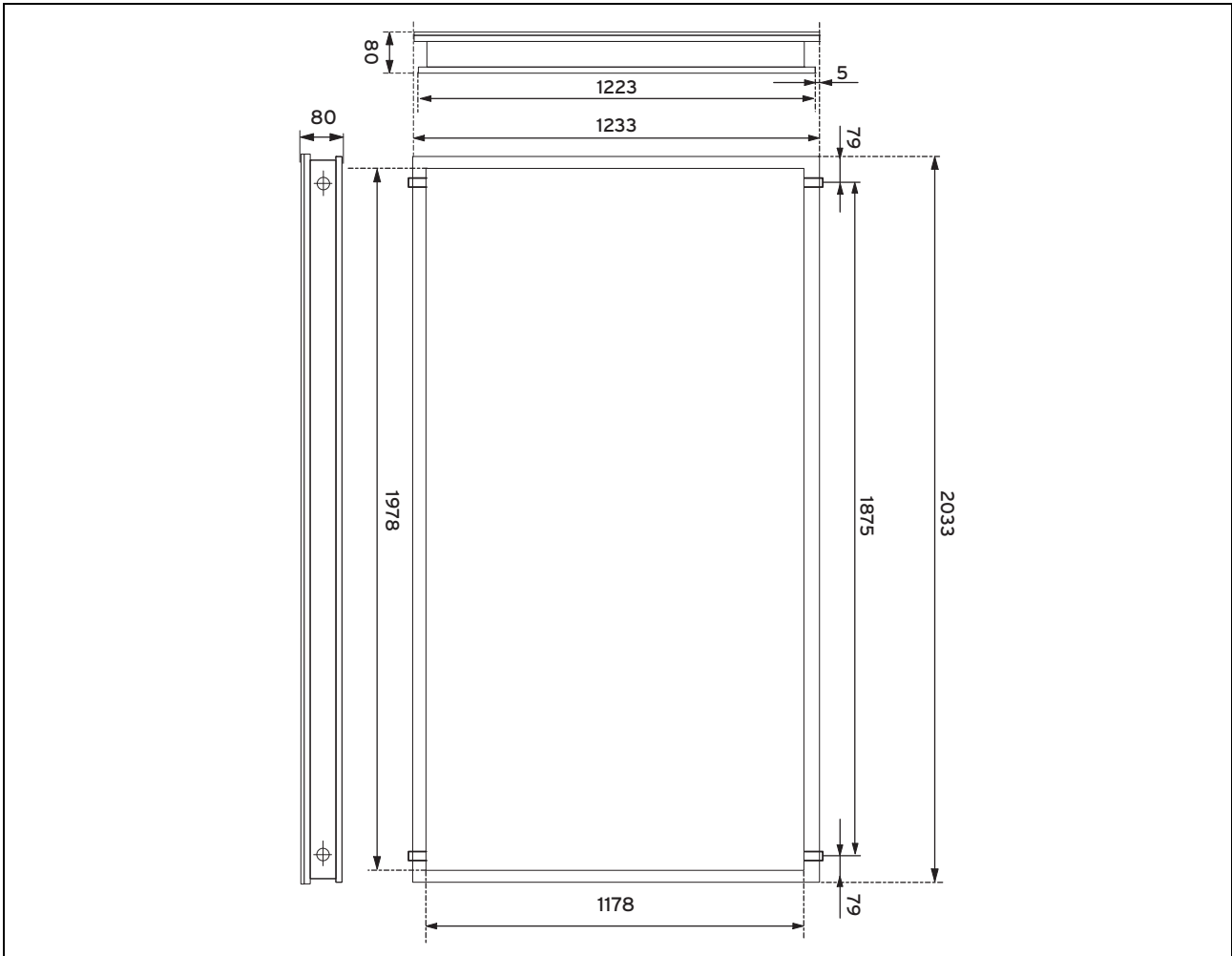


Fig. 10.2: Dimensions of vertical collectors

**Index**

<b>A</b>		<b>H</b>	
Applicability		Hydraulic connections	
Manual .....	5	Installation .....	29
Article number .....	5	Installing .....	54
<b>B</b>		<b>I</b>	
Ballast load (floating installation)		Identification plate .....	10
Determining .....	38	Installation clearances	
Brackets		Complying with .....	14, 36
Checking .....	59	Installing	
<b>C</b>		Checking .....	32, 56
CE label .....	9	Intended use .....	8
Checklist		<b>L</b>	
Installing .....	32, 56	Leaking connections	
Clearances		Sealing .....	60
Complying with .....	14, 36	<b>M</b>	
Collector components		Maintenance	
Checking .....	59	Preparing .....	58
Collectors		Maintenance plan .....	58
Checking .....	59	<b>P</b>	
Cleaning .....	59	Packaging	
Disposal .....	60	Disposal .....	33, 57
Installing .....	24, 27, 51	Pipe insulations	
Removing .....	61	Checking .....	59
Replacing .....	60	Disposal .....	59–60
Storing .....	11, 34	Replacing .....	59–60
Transporting .....	14, 36	Purpose	
Components		Unit .....	10
Putting together .....	16, 38	<b>R</b>	
Connection		Rack	
Selecting .....	14, 36	Defining clearances .....	46
Connection rules .....	14, 36	Installing .....	47
Connection schemas .....	14, 36	Recycling	
Connections		Collectors .....	61
Checking .....	59	Packaging .....	33, 57
Sealing .....	60	Solar fluid .....	61
Customer service .....	63	Roof bracket	
<b>D</b>		Defining edge clearances .....	18
Decommissioning .....	61	Determining the number .....	18
Disposal		Roof duct	
Collectors .....	61	Preparing .....	14, 37
Packaging .....	33, 57	<b>S</b>	
Solar fluid .....	61	Scope of delivery	
Documents, other applicable .....	5	Checking .....	12, 35
<b>F</b>		Select installation variant, flat roof .....	37
Final work		Service .....	63
Installing .....	32, 56		

# Index

Spare parts	
Maintenance .....	58
Troubleshooting .....	60

## T

Technical data .....	64
Dimensions .....	65
Type overview .....	10

## U

Unit	
Purpose .....	10
Use, intended .....	8









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